

This section discusses the existing physical, natural, and human environments on the NAPR property. The baseline for the disposal of NAPR is a fully closed base with no military activities and/or residents located at any facilities at NAPR. However, where it is appropriate to show the historical capacities or usage requirements, data sources based upon years previous to the full closure of NSRR are used.

The following descriptions of the existing environment are based in part on information presented in the ECP (U.S. Navy July 15, 2005) for NAPR, which provided detailed descriptions of the environmental conditions on NAPR; the LRA Reuse Plan for NAPR (CB Richard Ellis December 2004); the *Draft Biological Assessment for Land Transfer of Naval Station Roosevelt Roads, Puerto Rico* (Geo-Marine, Inc. September 2005); and numerous Navy documents pertaining to NSRR. This information was supplemented by a January 2004 field reconnaissance, personal interviews with involved agencies, and more current historical information provided by various local, Commonwealth, and federal agencies and maintained by the environmental staff at NAPR's Public Works Department (PWD).

While the proposed action is the disposal of NAPR, this EA evaluates reuse of the NAPR property as the most plausible direct outcome of that disposal. Once transfer of the NAPR property is completed, the potential reuse scenarios for the property are extensive. The LRA Reuse Plan created by the Commonwealth of Puerto Rico (CB Richard Ellis *et al.* December 2004) provides a consistent measure of the potential for specific reuses and their impacts and was, therefore, used to guide the contents of this EA. Where appropriate, the baseline resources discussed here are described according to the reuse

zones and associated land uses described in the Reuse Plan. Some of the resources discussed in this EA do not pertain only to specific reuse zones, and so a more wide-ranging discussion of the existing environment has been included as well as the details that are pertinent to the Reuse Plan. Where appropriate, this approach was taken to minimize unnecessary redundancy within the resource description.

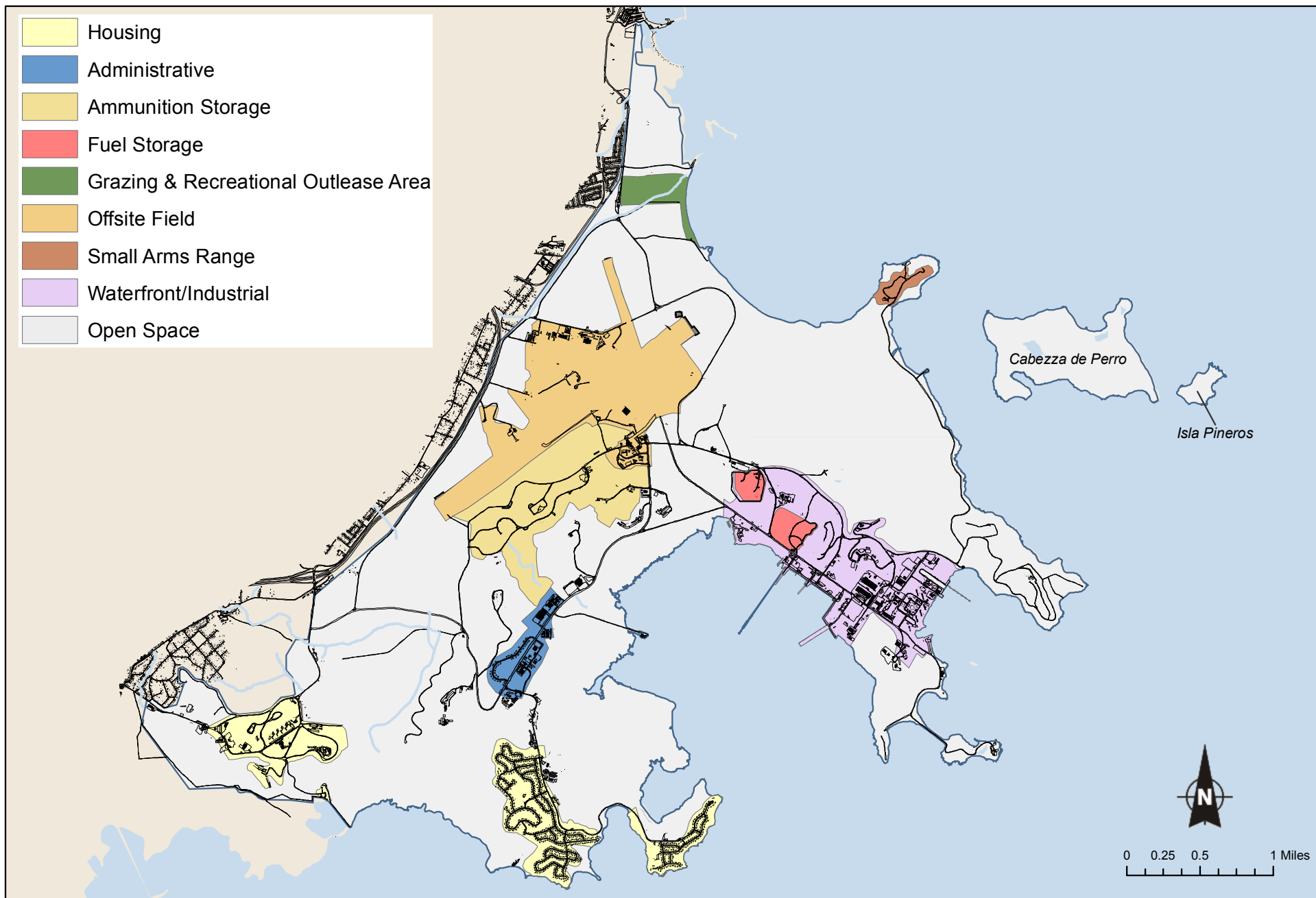
### **3.1 Land Use and Aesthetics**

#### **3.1.1 NAPR Land Use**

The total land area encompassed by NAPR is approximately 8,665 acres. This total includes 8,365 acres on the eastern coast of mainland Puerto Rico and another 300 acres on the nearby islands of Piñeros and Cabeza de Perro (see Chapter 1, Figure 1-3). Land uses at NAPR can be classified into three broad categories: improved, semi-improved, and unimproved. Residential, commercial, industrial/military, recreational, institutional, infrastructure, and open space uses are found within these general land use categories. Figure 3-1 shows the historical land uses at NAPR.

Improved land includes areas that have been intensively developed and maintained for mission and operational or aesthetic needs. Approximately 30% of NAPR is improved lands (U.S. Navy 2004). Included in the improved land use category are housing and administrative areas (Capehart and Bundy), the airfield, Camp Moscrip, the waterfront area, and the downtown area. There are more than 1,600 buildings and structures within the improved land areas, totaling approximately 5,800,000 square feet. The largest single component within the improved lands category are residential uses, which comprise approximately 2.4 million square feet in more than 800 buildings. About 0.7 million square feet are in commercial, retail, and office space; 0.5 million square feet are industrial space; 0.5 million square feet are storage space; and 0.4 million square feet are educational, institutional, and public amenity purpose space (Reuse Plan [pp 30-31]). Infrastructure improvements commonly associated with improved land (i.e., roads, wastewater treatment plants, utilities, etc.) are also part of this land-use category.

Semi-improved lands are characterized as areas that require regular maintenance (although not to the same extent as improved lands) due to operational considerations. Approximately 17% of the total land area at NAPR is semi-improved lands. Included in this land-use category are an agricultural out-lease area, some operations areas



Source: Geo-Marine, 2005; ESRI, 2004

**Figure 3-1**  
**Historic Land Uses**  
**Naval Activity Puerto Rico**

(e.g., ammunition storage area, small arms range, and fuel storage areas), and infrastructure improvements associated with these areas (U.S. Navy 2004 [pp 2-4]).

Unimproved land at NAPR primarily consists of open areas comprising marine habitat, coastlines, mangroves, upland forests, wetlands, and infrastructure improvements associated with these areas (primarily utility rights-of-way). Included in the unimproved lands are Isla Piñeros and Cabeza de Perro. Unimproved lands account for the largest amount of land at NAPR, encompassing approximately 53% of NAPR's land mass.

The nine proposed reuse zones (see Chapter 2, Figure 2-1) at NAPR include a mixture of developed lands and open space areas. Land use features within the proposed reuse zones are briefly discussed below.

- **Zone 1.** Zone 1 includes the airfield and adjacent support facilities. Approximately half of the land area within this zone is currently developed. The airfield has an 11,000-foot primary runway that is oriented southwest to northeast and a 6,000-foot secondary runway that is oriented southeast to northwest. There is also a helipad at the airfield with two helicopter landing pads. Most of the aircraft support facilities (hangars, repair shops, and operations buildings) are north of the primary runway. Ammunition and weapons storage areas are south of the primary runway (Reuse Plan [p A-33]).
- **Zone 2.** Zone 2 is referred to as the Bundy area in the southwestern portion of NAPR. Approximately 25% of the land area within this zone is developed for multi-family housing and supporting facilities (fitness center, small theater, library, recreation field, wastewater treatment plant). Zone 2 also includes a number of small storage and office buildings (Reuse Plan [p A-34]).
- **Zone 3.** The only land use in Zone 3 is a 9-hole golf course. Zone 3 is in the southwestern portion of NAPR. The golf course covers approximately 40% of Zone 3. Floodwaters from the Rio Daguao seasonally impact the golf course property (Ecology and Environment, Inc. 1987 [pp 3-10 to 3-11]).
- **Zone 4.** Zone 4 is located in the central portion of NAPR between the eastern ridge of the Delicias Hills and the mangroves along the coast of Enseñada Harbor. This includes the downtown section of NAPR, of which about 25% is developed. Developed areas include a number of commercial and institutional buildings as well as new and recently renovated multi-family structures.
- **Zone 5.** Zone 5 is referred to as the Capehart area. Approximately 70% of this zone is developed for residential and associated uses (i.e., schools, community center, storage buildings). Smaller one- and two-family homes are located in the central portion of the zone, while much larger houses are located on the elevated waterfront property at the “boot” of the southern peninsula on Punta Casca.

- **Zone 6.** Zone 6 includes the developed waterfront area at NAPR bordering Enseñada Harbor. The waterfront is dominated by a 2,600-foot long fixed fuel pier. An associated fuel tank farm consisting of eight aboveground fuel storage tanks is located in the northern portion of Zone 6. Other water-related facilities in this zone include a 72-slip small-boat marina, a 1,200-foot long cargo pier, port operations buildings, various hauling facilities, and extensive bulkheading. Approximately 70% of the zone is developed for industrial land uses. Various institutional and commercial uses also are present, but to a much lesser extent. Specifically, the former base hospital is located at the upper portion of the surrounding hills in the eastern section of this zone.
- **Zone 7.** Zone 7 is adjacent to the waterfront area. Approximately 25% of this zone are developed. The developed areas are primarily located at Camp Moscrip, which includes numerous two-story military quarters buildings and adjacent support facilities, a dry-dock/pier, Army Reserve facilities, new administrative offices, and new barracks.
- **Zone 8.** Zone 8 comprises approximately low-lying pasture and wetlands on the northern side of the north gate. Roads and a small fish market comprise the only developed area in this zone. Ceiba Beach and a fishing pier are located at the water's edge of Zone 8 and are accessible by the public.
- **Zone 9.** Zone 9 contains undeveloped mangrove forests and wetlands.

### 3.1.2 Surrounding Land Uses

The area surrounding NAPR is rural with large sections of rangeland. Ceiba and Naguabo are the communities nearest to NAPR; Ceiba is to the west and adjacent to the property and Naguabo is located directly southwest of NAPR (see Chapter 1, Figure 1-2). Both areas are former agricultural towns that are now primarily residential with supporting small-scale retail and institutional facilities; there is little industry in either town. Relatively higher density urbanized development is present in the city of Fajardo, located approximately 10 miles north of NAPR along Route 3 (see Figure 1-2). Puerto del Rey, one of the Caribbean's major recreational marinas with 1,100 slips, is located south of Fajardo less than 3 miles north of NAPR. San Juan, the capital of Puerto Rico, is located approximately 40 miles to the northwest.

### 3.1.3 Easements and Restrictions

In addition to the five separate properties on NAPR, which will remain under federal ownership but for which operational responsibility will be transferred to other federal agencies, road and utility easements or use agreements may be required after transfer of

NAPR to accommodate operations on these properties, provide utilities, and ensure site access, security, and effective maintenance and operations.

The Navy may also require road easements or use agreements to access environmental remediation sites on NAPR. In addition, transient institutional controls or land use restrictions may be applied to remediation sites for the duration of all clean-up activities. More detailed information regarding site contamination and potential restrictions is provided below in Sections 3.2 and 4.2.

#### **3.1.4 Local Land Use Plans and Land Development Regulations**

As federal property, NAPR is not currently within the jurisdiction of the Commonwealth or a municipality for planning or zoning purposes. However, after transfer of the property, about 90% of the property will be physically located within the municipal boundaries of Ceiba, while the remainder will be within the municipality of Naguabo.

Under Puerto Rico Law Number 75 of June 1975, known as the “Planning Board Law,” responsibility is assigned to the PRPB to guide development on the island in a way that promotes the general health, security, and well-being of the current and future residents of Puerto Rico. In accordance with this law, the PRPB and the Permits and Regulations Administration review proposed development projects on Puerto Rico to ensure that such projects are consistent with established zoning classifications and in compliance with applicable permit requirements.

The Municipal Reform of 1991 was adopted to decentralize the decision-making process from the central government to local municipalities (see Business Register <http://www.busregister.com/prbusinfo/municipalities.asp>). Law 81 of the Municipal Reform requires that each municipality prepare a Land Use Plan, subject to approval by the PRPB and the governor. Once a plan is approved, the law allows the municipality to solicit the transfer of planning and permitting processes in its territory from the PRPB and the Permits and Regulations Administration, respectively. None of the communities surrounding NAPR (i.e., Ceiba, Fajardo, Naguabo) currently have land use plans in place, which are required before a municipality can implement zoning regulations. Furthermore, none of these communities are expected to develop land use plans or implement zoning regulations in the near future due to a lack of staffing (Diaz 2004).

### 3.1.5 Aesthetics

Aesthetics at NAPR vary substantially between the developed and undeveloped portions of the property. The large amount of undeveloped land on NAPR, which includes unique natural communities, rolling topography, and extensive stretches of pristine coast, substantially contribute to the overall aesthetic value of the area. Developed areas are cleared and relatively utilitarian in appearance and any open space is generally maintained in turf grasses. From off-shore, NAPR appears as a set of functionally grouped structures, including piers, buildings, and roadways, set amidst a background of densely vegetated mountains and hills. Buildings used for administration, housing, and operations are generally low horizontal structures of one or two stories, whereas the larger hangars and maintenance structures are taller and more visible.

## 3.2 Environmental Contamination

This section describes the existing conditions at NAPR regarding potential environmental contamination that could be sources of releases to the environment. In order to identify all known areas of contamination, the Navy has conducted an ECP assessment. The results of this assessment are documented in the *Final Phase I/II Environmental Condition of Property Report, Former U.S. Naval Station Roosevelt Roads, Ceiba, Puerto Rico* (U.S. Navy July 15, 2005).

The ECP report, which is incorporated into this document by reference, summarizes significant environmental condition of property information available from a number of existing information sources. These are reflected in the following specific environmental compliance program areas:

- Hazardous materials
- Hazardous waste
- Petroleum product management
- Underground and aboveground storage tanks
- Oil/water separators
- Air emissions
- Asbestos-containing material (ACM)

- Pesticides
- Polychlorinated biphenyls (PCBs)
- Medical wastes
- Munitions and Explosives of Concern (MEC)
- Lead-based paint (LBP)
- Water
- Wastewater
- Radioactive materials
- Solid waste
- Landfills

The purpose of the ECP effort was to document the existing environmental condition of property subsequent to the closure of Naval Station Roosevelt Roads on March 31, 2004 and prior to disposal. The ECP report discloses the available factual and environmentally relevant information gathered during this effort regarding the condition of the property. The ECP effort focused on all available information pertaining to current and past uses of the property, specifically focusing on activities that might pertain to the use, storage, release, or disposal of hazardous substances and petroleum products or their derivatives. The ECP effort included (but was not limited to) the following tasks:

- Review of current and historic operational records for any activity where hazardous materials or petroleum products were involved;
- Review of records pertaining to all recent and historic prior investigations and cleanup efforts regarding release or disposal of hazardous materials or petroleum products;
- Analysis of historic aerial photography;
- Interviews with current and former employees;
- Physical site inspections of property and improvements; and
- Sampling and analysis of soil and water from potentially contaminated sites.



Following the outline provided above, the ECP reviewed all available information in all environmental compliance program areas. This process resulted in the identification of new sites as well as known sites where remedial work has been ongoing. Figure 3-2 depicts all the sites identified by the ECP.

Based on this identification of sites, the NAPR property was then classified into the following three categories:

- **Category 1:** uncontaminated;
- **Category 2:** all necessary remedial actions have been taken;
- **Category 3:** additional investigation and/or cleanup work is required.

The vast majority of NAPR property falls into Category 1. Category 1 is defined as all property where no release is known or suspected to have occurred (i.e., all property not identified as a “site” by the ECP), as well as all sites identified by the ECP where a release was suspected but further investigation failed to produce confirmation of a release. Category 2 includes all sites where all necessary remedial actions have been taken in response to a release. An implemented remedy for Category 2 sites may or may not include a land use control. Category 3 sites require additional work and include newly identified sites as well as known sites where cleanup efforts are ongoing.

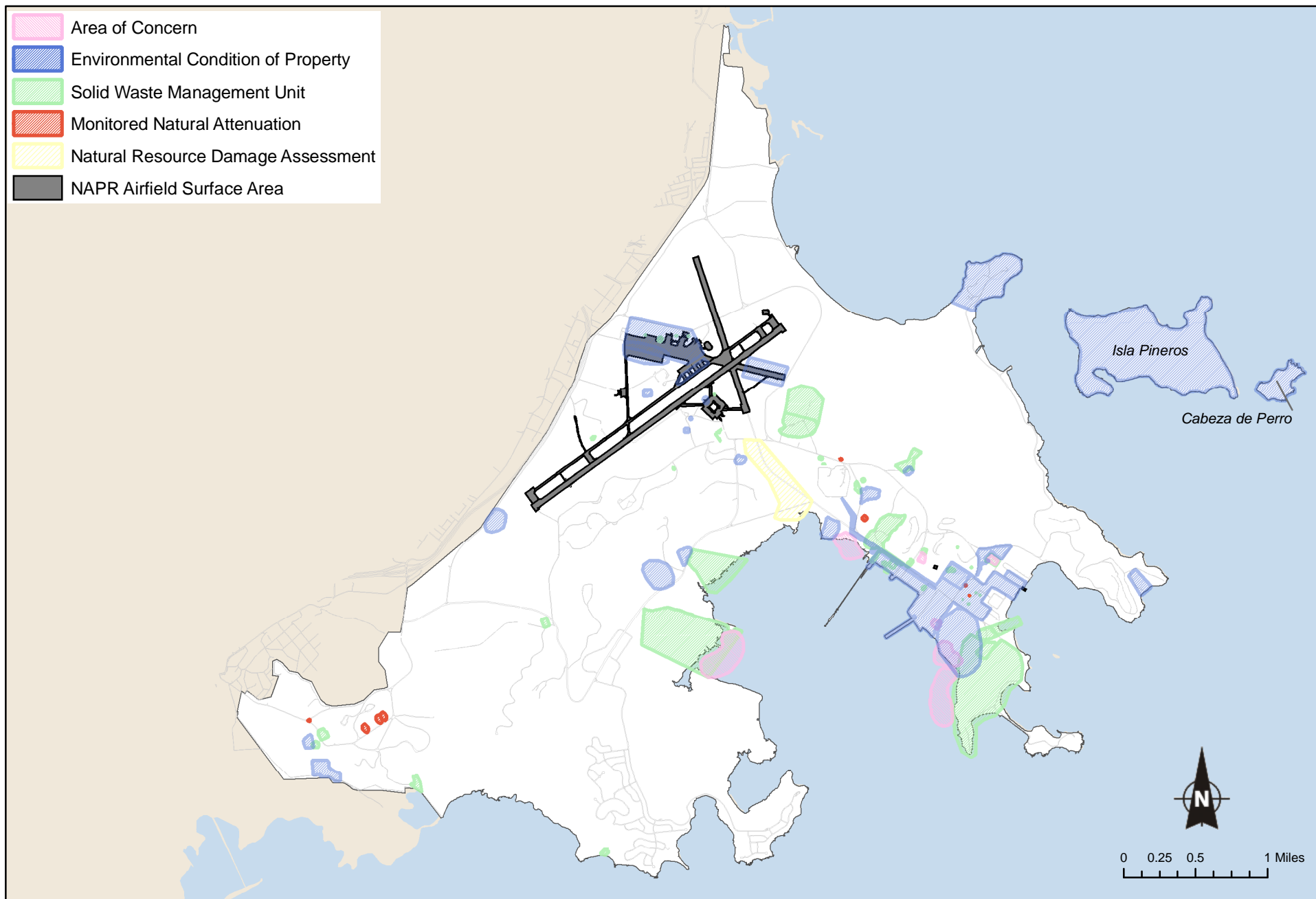
EPA uses the term “Corrective Action Complete” (CAC) to indicate that no additional investigation is required at a site. At NAPR, this includes all Category 1 and Category 2 sites. Figure 3-3 depicts these sites and further breaks them down into sites with residual land use controls (CAC with controls) and sites with unrestricted use (CAC without controls). Figure 3-4 depicts all sites with remaining cleanup requirements.<sup>1</sup>

### **3.2.1 Installation Restoration Program**

The ECP report identified a mature installation restoration program (IRP) at the facility administered under a Resource Conservation and Recovery Act (RCRA) Part B permit specifying corrective action. The current permit was issued by EPA on October 20, 1994 and addresses 55 solid waste management units (SWMUs), four areas of

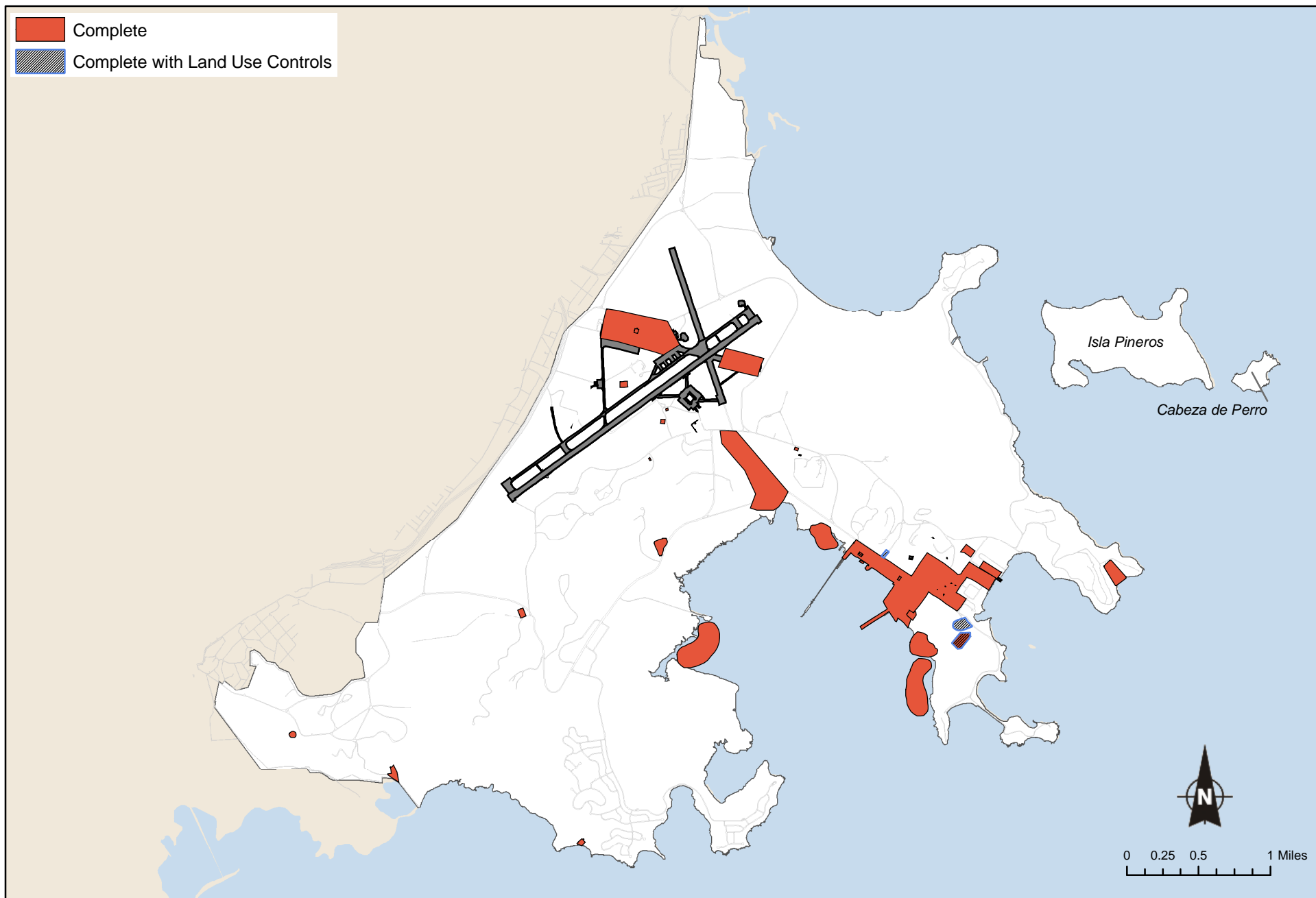
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<sup>1</sup> Information presented in Figures 3-3 and 3-4 is current as of publication of this EA. Ongoing work and negotiations with regulatory authorities may change the categories of sites.



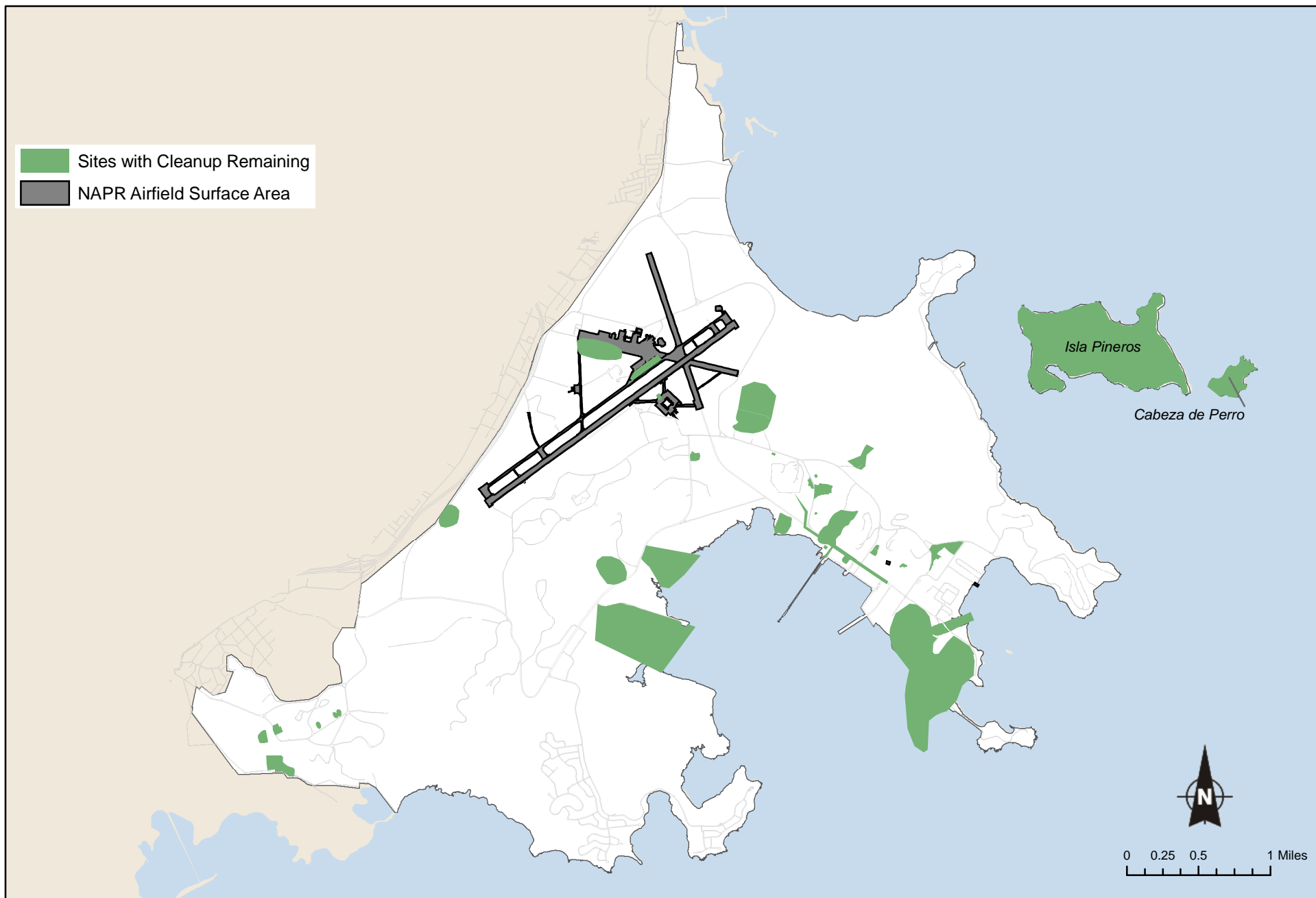
Source: Geo-Marine, 2005; ESRI, 2004

**Figure 3-2**  
**Sites Identified by the ECP**  
**Naval Activity Puerto Rico**



Source: Geo-Marine, 2005; ESRI, 2004

**Figure 3-3**  
**Sites Where Cleanup Is Complete**  
**Naval Activity Puerto Rico**



Source: Geo-Marine, 2005; ESRI, 2004

**Figure 3-4**  
**Sites with Remaining Cleanup Requirements**  
**Naval Activity Puerto Rico**

concern (AOCs), and an additional unclassified site for a total of 60 sites. A permit renewal application was submitted in 2004 that proposes updated actions based on progress to date. The sites are in various stages of study and cleanup, ranging from preliminary investigation to remedial action complete. These sites are identified as SWMU and AOC sites on Figure 3-2. The current status of the 60 sites is as follows:

- 30 sites – corrective action complete;
- 9 sites – proposed for no further action (pending public review);
- 7 sites – proposed for no further action with land use controls (pending public review); and
- 14 sites – various stages of ongoing study and remediation.

Following the base closure, installation operations that required a RCRA Part B Permit have ceased, and the regulated units are now undergoing closure according to the permit requirements. Upon completion of closure, only the corrective action portions of the permit need to remain in force. The EPA has indicated its desire to convert the existing Part B permit into a §7003 Administrative Order on Consent to regulate the remaining corrective action tasks rather than processing the Part B permit renewal. EPA has prepared a draft §7003 Order and negotiations with the Navy are ongoing. As negotiations on the §7003 Order continue and ongoing cleanup work progresses, the status of sites will change. The final §7003 Order will reflect the most current information as of the date the Order is issued.

### **3.2.2 Tank Management Program and Petroleum Spills**

The ECP identified eight storage tank sites where monitored natural attenuation (MNA) activities are ongoing, as required by the Storage Tank Management Division of the Puerto Rico EQB. These sites are identified as MNA sites on Figure 3-2. Three of the eight sites are included within a parcel that would remain under federal ownership. Caretaker status transfer to another federal agency is pending.

Aside from the MNA sites, other fuel spills/releases are being addressed by the IRP. In addition to both the tank management program and the IRP, a JP-5 jet fuel spill in 1999 resulted in impacts on a mangrove area located in the vicinity of Tow Way Drive and Enseñada Honda. Given the limited accessibility of the area, little cleanup was pos-

sible. A Natural Resources Damage Assessment (NRDA) for the impacted areas was conducted in 2002 and mitigation efforts are ongoing (U.S. Navy March 31, 2005).

### **3.2.3 New Sites**

The ECP effort identified 23 new sites where activities may have resulted in spills or other releases to the environment. These 23 sites were not previously included in any investigation or remediation programs and are identified as ECP sites on Figure 3-2. The ECP included targeted sampling at 20 of the 23 sites in an attempt to confirm or deny if a release had occurred. Sampling was not conducted at three sites for various reasons (discussed below). Based on the sampling results, sites were either retained for further investigation and proposed for addition to the IRP or were proposed for no further action. These proposals were included in the 2004 permit renewal application and are reflected in the draft §7003 Order currently under negotiation. Of the 23 new sites identified by the ECP, 16 are proposed for further investigation and cleanup activities. The current status of all 23 sites is as follows:

- 14 sites – sampling results confirmed release; further action is required; proposed for addition to the IRP;
- 6 sites – sampling found no evidence of release; proposed for no further action;
- 1 site – not sampled; release presumed; proposed for addition to the IRP; area would remain under federal ownership; caretaker status transfer to another federal agency is pending;
- 1 site – not sampled; area would remain under federal ownership; caretaker status transfer to another federal agency is pending; site will remain an active small arms range, and there are no cleanup requirements while the site remains active; and
- 1 site – not sampled; proposed for addition to the IRP to be addressed under the Navy's munitions response program (MRP).

### **3.2.4 Identification of Uncontaminated Property**

The Community Environmental Response Facilitation Act (CERFA) stipulates that the federal government must identify uncontaminated property prior to transfer. Uncontaminated property is defined as “real property on which no hazardous substances and no petroleum products or their derivatives were known to have been released or disposed

of” [42 USC 9620 (h)(4)(A)]. The law stipulates specific steps that must be taken in order to determine which property is uncontaminated. The ECP effort was designed to meet these statutory requirements for the identification of uncontaminated property. The CERFA Identification of Uncontaminated Property must be submitted to the appropriate state official, in this case the Puerto Rico EQB for concurrence. The Navy submitted the Identification of Uncontaminated Property to the Puerto Rico EQB on 21 March 2005. Comments from the Puerto Rico EQB on the CERFA Uncontaminated Property report were received in May 2005, and resolution of issues raised by these comments is ongoing.

### **3.2.5 Lead-Based Paint and Asbestos**

As part of the ECP effort, detailed surveys of the installation were performed to document the current status of LBP and ACM within installation facilities. These surveys were performed in accordance with applicable regulations and industry standard practices. Three separate reports document this work conducted in support of the ECP effort and are incorporated into the ECP document by reference:

- *Final Asbestos Inspection Report for Non-Residential Buildings, Naval Activity Puerto Rico*, July 1, 2005 (includes bachelor housing);
- *Final Asbestos Inspection Report for Military Family Housing, Naval Activity Puerto Rico*, July 1, 2005; and
- *Final Lead-Based Paint/Risk Assessment Report for Military Family Housing, Naval Activity Puerto Rico*, July 1, 2005.

## **3.3 Infrastructure Facilities and Utilities**

### **3.3.1 Potable Water Supply and Distribution**

Potable water is obtained from the Rio Blanco River. According to an agreement between the Navy and the Commonwealth of Puerto Rico, the Navy can withdraw up to 7 million gallons of raw water per day from two intake points on the Rio Blanco, approximately 10 miles west of NAPR. However, these water rights will cease once the Navy no longer has a presence at NAPR. The average amount of water withdrawn from the Rio Blanco River by the Navy over a nine-month period has been recorded at 1.012 million gallons per day (mgd) (Reuse Plan [p A.b 15]).

From the intakes on the Rio Blanco raw water flows by gravity through an 11-mile, 27-inch reinforced concrete pipe to a 46.1-million gallon reservoir to the west of FDR Drive. The raw water is treated at the NAPR water treatment plant on Langley Drive, just north of the reservoir. The plant's maximum rated capacity is 4.0 mgd. The water treatment plant is operated as a conventional, rapid sand filter plant. The potable water distribution system at NAPR is extensive, including approximately 68 miles of distribution pipes, seven pump stations, and five storage tanks with a combined storage volume of 2.6 million gallons. The water treatment facility, reservoir, and distribution system were originally constructed in the 1940s. Major repairs and facility upgrades were completed at the treatment plant in 1976 and 1986 (U.S. Navy 2004 [pp 5-133 to 5-136]).

The water treatment system at NAPR is currently meeting all applicable regulations for finished water quality as mandated by the Puerto Rico Department of Health. Available water quality data indicate that the tested parameters on the raw water do not exceed EPA's limits for drinking water. No previous or ongoing violations have been reported for the water treatment system (U.S. Navy 2004 [p 5-136]).

### **3.3.2 Wastewater Treatment**

Wastewater generated at NSRR was collected and conveyed to one of three wastewater treatment plants (WWTPs) on the property for treatment and final disposal:

- Bundy WWTP (permitted capacity of 0.65 mgd);
- Capehart WWTP (permitted capacity of 1.13 mgd); and
- Forrestal WWTP (permitted capacity of 1.01 mgd).

Each WWTP provides tertiary treatment before the treated effluent is discharged into the ocean via outfalls (U.S. Navy 2004 [p 5-137]). When NAPR was an active military base, the combined average daily treated flow from the three plants was approximately 1.3 mgd (Garcia 2004).

The wastewater collection system at NAPR consists of approximately 32.5 miles of gravity lines, 9.5 miles of force mains, approximately 906 manholes, and 28 pump stations. The wastewater system at NAPR also includes eight septic tanks that were installed in remote areas of NAPR where extension of the sewer system was not considered



to be economically feasible (U.S. Navy 2004 [p 5-143]). All eight septic tanks were operational as of December 2003.

### **3.3.3 Storm Water**

There are more than 80 storm water outfalls in the mangrove areas and surrounding bays at NAPR. These outfalls receive flow from a system of drop inlets, drainage ditches, culverts, and pipes from both developed (industrial and residential) and undeveloped areas and sheetflow from both paved and unpaved areas. The vast majority of these outfalls are not regulated under the EPA's Multi-Sector General Permit program because they receive storm water from non-industrial activities or via sheetflow from non-industrial areas (U.S. Navy 2004 [pp 5-143 to 5-144]).

Six outfalls at NAPR are regulated under the EPA's Multi-Sector General Permit program. NSRR obtained initial permit coverage in 1995 and re-applied for the permit in 2000, which became effective upon submittal (U.S. Navy 2004 [p 5-143]).

Recent inspections conducted under NAPR's Storm Water Pollution Prevention Plan (SWP3) did not identify any significant sources of potential environmental contamination associated with storm water discharges, outfalls, or storm ditches on the property.

### **3.3.4 Solid Waste**

The NSRR 2001 *Final Solid Waste Study* shows 1999 and 2001 estimates of total annual station generation of non-hazardous solid waste—before notification of station closure—at 13,582 tons. Before station closure and downsizing of station activities, solid waste was handled and transported by station personnel and private contractors within and from NSRR. Wastes that were recoverable or resalable, as well as oversized wastes, were collected by the Transportation Division and by various public works shops. Private contractors handled all recoverable wastes such as waste oil, dirtied fuels, batteries, tires, and scrap metals. The Defense Logistics Agency (DLA) handles resalable wastes. Since 1999, when a new cell at the landfill became operational, all other solid waste was disposed in the station's landfill.

### **3.3.5 Power**

NAPR purchases electricity from the Puerto Rico Electric Power Authority (PREPA), which transfers electrical power to the property at two delivery points: two 38

kilovolt [kV] circuits and a single 38 kV circuit at the airfield. The 38 kV circuits serve 11 substations on the property and those substations in turn serve loads in their vicinity at 13.2 kV, 4.16 kV, and 480 kV (Reuse Plan [p A.b 22]). All loads on the distribution circuits can be fed from more than one substation.

In 2001, the maximum demand for the Dagua Service was estimated at approximately 15,788 kilovolt-amperes (kVA). Annual consumption was estimated at approximately 95,496 megawatts per hour (MWH). The airfield had a maximum demand of approximately 1,462 kVA and annual consumption of approximately 7,682 MWH.

Both underground and aerial power lines service the housing areas on NAPR. Underground conduits for cable and telephone are also in place for housing, but cables for these utilities were never installed.

### **3.3.6 Transportation**

NAPR maybe accessed from the west via PR-3, a two-lane highway, and PR-53, a four-lane highway. Both roads extend in a southwest to northeast direction along the western boundary of the property. Primary roads within NAPR include Tarawa Drive, Forrestal Drive, Langley Drive, FDR Drive, Bennington Drive, and Boxer Drive. These roads are two lanes wide, paved, and allow access to nearly all areas of the property. Entry to NAPR is restricted to two gates:

- Gate 1 is at the north end of the property at the intersection of Tarawa Drive and Boxer Drive and is accessed via PR-3; and
- Gate 3 is south of the airfield at the east end of Bennington Road and can be accessed by both PR-3 and PR-53.

## **3.4 Topography, Geology, and Soils**

### **3.4.1 Topography**

The regional topography of NAPR consists of an interrupted, narrow, coastal plain with small valleys extending from the Sierra de Luquillo range. Elevations within NAPR range from sea level to approximately 297 feet (90.5 meters [m]) above mean sea level (MSL). Immediately to the west of NAPR, the hills rise abruptly to heights of 800 to 1,500 feet (244 to 457 m) above MSL. The tallest peak is approximately 1.2 miles (1.9 km) west of the NAPR boundary. There are a series of ridges on NAPR, two of which separate the airfield and the golf course (Zones 1 and 3) from the port-waterfront

(Zone 6), downtown (Zone 4), and Capehart (Zone 5 and a small section of Zone 9) areas. The third ridge exists in the Bundy area (Zone 2). Relief is low along the shoreline, which is characterized by lagoons and mangrove swamps (Defense Mapping Agency 1977 (Reuse Plan [p 58])). The nine zones can be distinguished by the topography of NAPR, as shown in Figure 3-5.

- **Zones 1 and 3.** The topography of Zones 1 and 3 (airfield and golf club areas) is characterized by flat areas nestled into a valley surrounded by the foothills of the coastal mountains to the north and the Delicias Hills to the south. Elevations range from 11 to 60 feet (10.6 to 18 m) above MSL. The area is gently sloping. The established elevation of the airfield is 38 feet (11.6 m).
- **Zone 2.** Elevations in Zone 2 (Bundy area) range from less than 10 to 192 feet (3 to 58.5 m) above MSL. Although the tops of hills have been cleared and leveled to accommodate development, grades exceeding 15% on the hillsides constrain development. The eastern and western periphery of Zone 2 are characterized by gently rolling hills and flat areas with slopes of 5% to 12%. Significant previous grading has altered much of the natural topography in the area.
- **Zone 4.** Zone 4 (downtown area) encompasses the northern and southern portions of the Delicias Hills, an undulating elevated ridge that buffers airport activity from the central portion of the site. Elevations in Zone 4 range from 16 to 297 feet (5 to 90.5 m) above MSL. The highest elevation occurs on the North Delicias Hill (see Figure 3-5). Development in the area is restricted to the hilltops and the foothill areas. Although the tops of the hills and foothills have been cleared and leveled to accommodate construction, the hillsides are sloped significantly enough to limit development. The periphery of Zone 4 is characterized by moderately steep hills and flat areas with slopes of 5% to 60%.
- **Zone 5.** Elevations in Zone 5 (Capehart area), which is located directly southeast of the Bundy area, range from between 16 to 100 feet (5 to 30.5 m) above MSL. Some hilltops have been cleared and leveled to accommodate construction, primarily housing. The hillsides are too steep to accommodate development. Significant previous grading has altered much of the natural topography of the area.
- **Zones 6 and 7.** The area that encompasses Zones 6 and 7 (port-waterfront and science park areas) is generally flat near the port-waterfront area, with steeper slopes encircling the Bahia de Puerca. A central ridge runs the length of the northern peninsula at NAPR, forming a natural division between the hills and the port-waterfront area. The area elevation ranges from less than 10 feet to 199 feet (3 to 61 m) above MSL. Topography has not been a constraint on industrial development in the port-waterfront area.

- **Zone 8 and 9.** Zone 8 (north gate area) consists of low-lying pastures and wetland areas. The land is adjacent to a large conservation area. Zone 9 (conservation area) also primarily consists of low-lying, nearly continuous undeveloped mangrove forests and wetlands on the mainland NAPR property. In addition, this zone includes three small islands (Isla Piñeros, Isla Piñerita, and Isla Cabeza de Perro) off the east coast of Punta Media Mundo.

### **3.4.2 Geology**

The island of Puerto Rico is part of the Caribbean tectonic plate. An east-west trending spine of mountains (the Cordillera Central) forms the backbone of the island. These mountains are volcanic in origin, and the oldest rocks are Jurassic agglomerates (United States Geological Survey [USGS] 1979).

Puerto Rico is located within a seismically active zone. Earthquakes affecting the island are usually low to moderate-focus events; however, three destructive earthquakes have occurred on the island within the 120 years. Seismically active areas characterize the ocean floor east, west, and north of the island. NAPR is located in Seismic Zone 3, which presents a moderate earthquake hazard. (Zone 4 is the maximum seismic risk zone.)

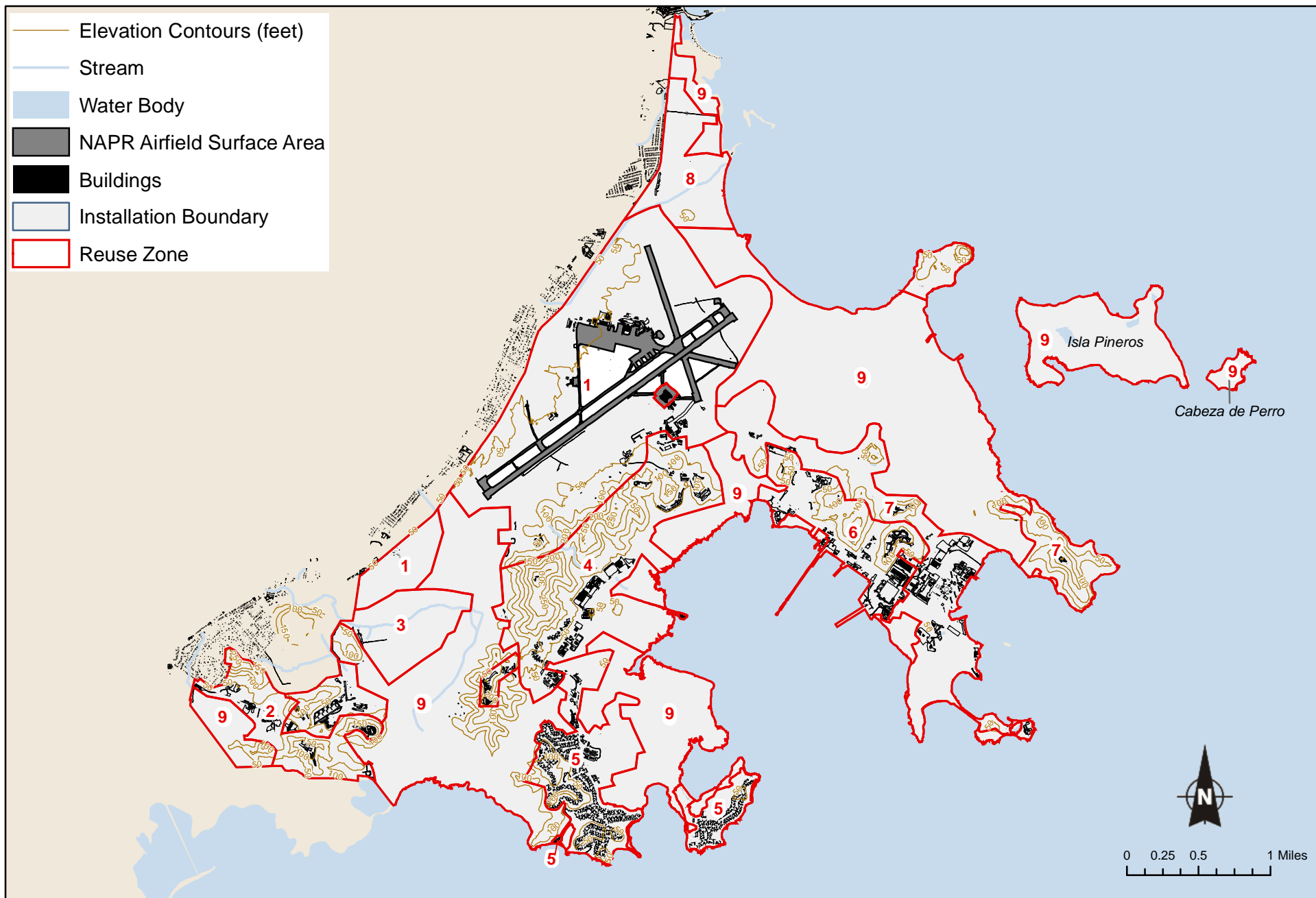
### **3.4.3 Soils**

The soils at NAPR are primarily sediments of mixed origin or residuum from volcanic rocks (see Figure 3-6). Soil depths range from shallow (less than 1 foot [0.3 m]) to deep (more than 6 feet [1.8 m]). In general, the soils are nearly level to strongly sloping; poorly drained in low-lying areas and well drained on side slopes; and susceptible to erosion where slopes exceed 5%. Many soils of the area have a high shrink-swell potential.

## **3.5 Hydrology and Water Quality**

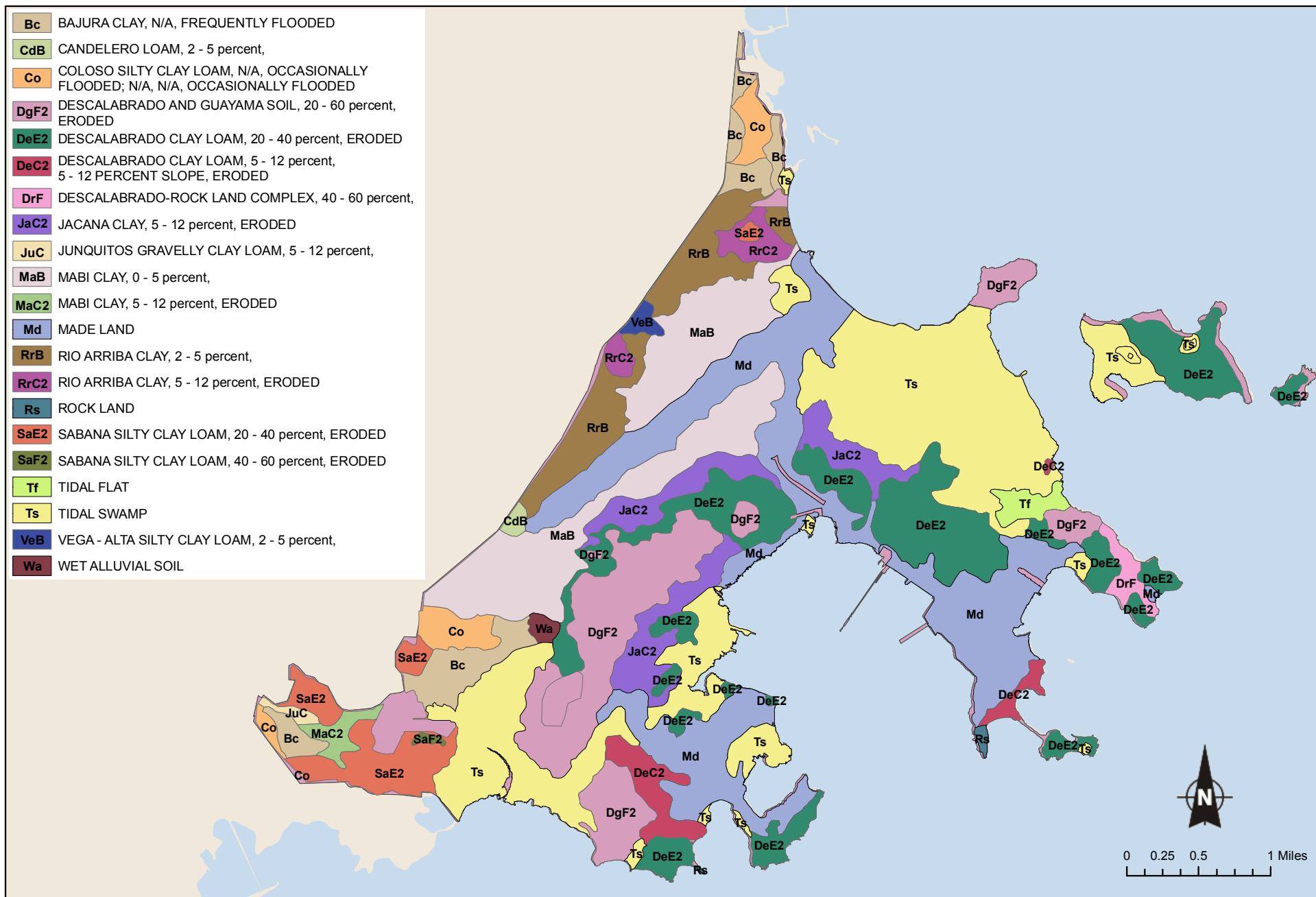
### **3.5.1 Surface Water**

Several streams that originate in the foothills northwest of NAPR flow through NAPR and drain the lands that make up NAPR. These streams include the Rio Daguao and various named and unnamed creeks, and they are an important source of freshwater flow and nutrients to large marshes and the Daguao and Demajagua mangrove forests (U.S. Navy 1998). In addition to freshwater drainages, estuarine open water lagoons exist in association with the Los Machos mangrove forest.



Source: Geo-Marine, 2005; ESRI, 2004

**Figure 3-5**  
**Topography**  
**Naval Activity Puerto Rico**



Source: Geo-Marine, 2005; ESRI, 2004

**Figure 3-6**  
**Soil Classifications**  
**Naval Activity Puerto Rico**

The stream systems draining the NAPR are subject to dramatic flooding at any time of the year, but especially during rainy season. Moreover, development and changes in land use in upstream areas outside of NAPR as well as changes on NAPR lands directly affect the drainage systems flowing through NAPR (see Figure 3-7). Increased development adjacent to NAPR, in the town of Ceiba, has resulted in an increase in the amount of surface water runoff reaching NAPR and in ponding, erosion, and flooding, particularly in the vicinity of Boxer Drive (U.S. Navy 2004).

### **3.5.1.1 Rio Daguao Drainage System**

The Rio Daguao is the largest river system that flows through NAPR. Its drainage basin covers about 4,380 acres (Ecology and Environment, Inc. 1987) and includes three primary channels: Rio Daguao, Quebrada Seca, and an unnamed tributary to Rio Daguao. The system flows through the southwest portion of NAPR and drains to the Daguao mangrove forest. An extensive area in the southwest portion of the site mapped as the 100-year flood zone is associated with Rio Daguao and its tributaries.

Rio Daguao originates in the hills northwest of NAPR, flows past the Ward of Daguao, enters NAPR in the south portion of the activity, and flows south to the Daguao mangrove forest, approximately 4 miles downstream from its source (Ecology and Environment, Inc. 1987). In the upper portions of the watershed, elevations range from 400 to 1,000 feet above sea level and the main channel is fed by small intermittent streams that drain steep hillsides, many of which have soils prone to rapid runoff and side slopes of 30% or greater (Ecology and Environment, Inc. 1987). Gutters, ditches, and paved areas within the Ward of Daguao and land cleared for pasture and development within the watershed contribute to accelerated runoff.

Quebrada Seca also originates in the hills northwest of NAPR and flows southeast to its confluence with Rio Daguao, south of Langley Drive. Elevations in this sub-basin range from near sea level to 1,000 feet above sea level and side slopes can reach 40% or greater (Ecology and Environment, Inc. 1987). Slopes at NAPR range from 30 feet above sea level to 3 feet, with slopes of 1% or less (Ecology and Environment, Inc. 1987). The town of Quebrada Seca is located within the drainage area for this channel. Development in the town, which extends up the side slopes, and cleared land contribute to water with high velocity and low concentration time in the channel (Ecology and Envi-

ronment, Inc. 1987). Much of the NAPR land within this sub-basin is within the 100-year flood plain (Ecology and Environment, Inc. 1987).

An unnamed tributary flows into Rio Daguao as it enters the Daguao mangrove forest at NAPR. Four intermittent stream channels enter NAPR (Ecology and Environment, Inc. 1987) and converge near the southwest end of Oftsie Airfield. These tributaries collect runoff from the southwest portion of Oftsie Airfield and from civilian areas northwest of NAPR before converging with Rio Daguao. Portions of Zones 1 through 5 and adjacent sections of Zone 9 are within the Rio Daguao drainage basin.

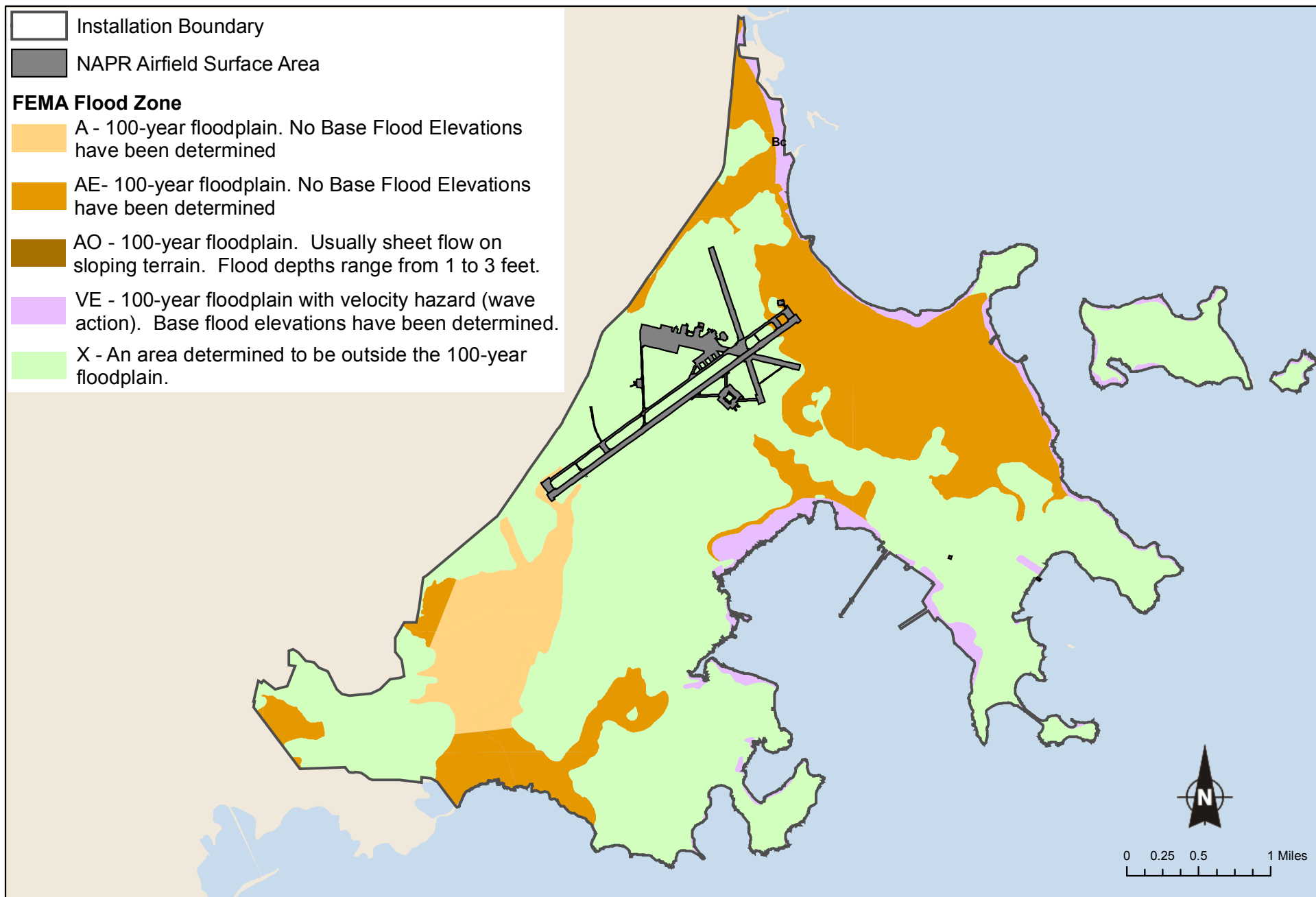
#### **3.5.1.2 Quebrada Aquas Clara Drainage System**

The Quebrada Aquas Clara drainage system flows through the northern portion of NAPR. The system includes two sub-basins, Quebrada Aquas Clara and an unnamed tributary, and drains approximately 1,320 acres of land (Ecology and Environment, Inc. 1987). The system also includes an extensive area designated as a 100-year floodplain.

This drainage system has been significantly altered from its natural course. Quebrada Aquas Clara originally flowed southeast, through the central portion of NAPR, to Enseñada Honda (Ecology and Environment, Inc. 1987). In association with the construction of Ofstie Airfield, Quebrada Aquas Clara was rerouted to flow through the northern portion of NAPR and empty into Puerto Medio Mundo (Ecology and Environment, Inc. 1987).

Quebrada Aquas Clara originates in the hills southwest of the community of Ceiba and flows northeast to the boundary of NAPR, then continues northeast along the north side of Boxer Drive before flowing through the Demajagua mangrove forest and into Puerto Medio Mundo. The majority of the sub-basin is civilian land west of NAPR. Elevations outside NAPR range from 50 feet to 900 feet above sea level, and slopes in the hillsides range from 30% to 50% (Ecology and Environment, Inc. 1987). The Ward of Aquas Claras covers the foot slopes and lowlands. Rapid runoff from the steep slopes, roadbeds, ditches, storm drains, and agricultural activities cause stream flow to concentrate quickly (Ecology and Environment, Inc. 1987).





Source: Geo-Marine, 2005; ESRI, 2004

**Figure 3-7**  
**Drainage and Floodplains**  
**Naval Activity Puerto Rico**

An unnamed tributary originates in the hills west of the community of Ceiba and joins Quebrada Aquas Clara near the intersection of Boxer Drive and Tarawa Drive. The combined streams flow east within the original channel of the unnamed tributary. Elevations outside NAPR range from 25 feet above sea level to 650 feet above sea level in the hills to the west. Slopes are from 2% to 5% in most of the sub-basin and from 20% to 35% in the western hills (Ecology and Environment, Inc. 1987). Urban and residential development and agricultural use in the area around Ceiba have increased the rate of runoff in this sub-basin. Portions of Zones 1 and 8 and adjacent sections of Zone 9 are within the Quebrada Aquas Clara drainage basin.

### **3.5.1.3 Quebrada Ceiba Drainage System**

The Quebrada Ceiba drainage system comprises approximately 1,575 acres of land, including 50 acres at NAPR (Ecology and Environment, Inc. 1987). Quebrada Ceiba originates in the hills west of Santa Macia, flows east through Santa Macia and enters NAPR near the intersection of Route 979 and Los Machos Road. It continues northeast across the northernmost portion of NAPR, through the Demajagua mangrove forest and into Bahia Demajagua. The majority of the drainage basin is civilian land west of NAPR and includes steep slopes and densely developed valley areas (Ecology and Environment, Inc. 1987). The land at NAPR is within the 100-year floodplain, and land use within the civilian areas contributes to flooding. Portions of Zone 8 and adjacent sections of Zone 9 are within the Quebrada Ceiba drainage system.

### **3.5.1.4 Other Drainage**

In the southwestern portion of the site an unnamed tributary to Quebrada Palma carries drainage off-site through civilian areas to the south. The tributary originates north of NAPR and flows south through NAPR lands in the vicinity of the Bundy area, then flows through civilian lands to Bosque Estatel de Ceiba. Portions of Zone 2 and adjacent sections of Zone 9 are within the Quebrada Palma drainage system.

Smaller drainages collect water from NAPR lands and channel it into the Los Machos mangroves and mangroves along Enseñada Honda. Drainage from the northeast portion of Ofstie Airfield flows east, via multiple channels, into the Los Machos mangrove forest. These features drain portions of Zones 1 and 7 and adjacent sections of Zone 9. Additional improved channels direct drainage from the central portion of Ofstie

Airfield (taking advantage of the original channel for Quebrada Aguas Clara) and from the NAPR downtown area, southeast into mangroves along Enseñada Honda. These features drain portions of Zones 1, 4, 6, and 7 and adjacent sections of Zone 9. Areas associated with these drainages and with the Los Machos mangrove forest and mangroves along Enseñada Honda are mapped as 100-year flood plain.

Isla Piñeros and Isla Cabeza de Perro lack fresh surface water sources. Isla Piñeros has three brackish water lagoons. The largest lagoon covers approximately 4.5 acres in the southwest portion of the island and is perennially flooded. An additional perennially flooded area covers approximately 1.9 acres in the northeast portion of the island and a third, intermittently flooded lagoon covers approximately 0.6 acres in the northeast portion of the island (Ecology and Environment, Inc. 1987). These islands are included in Zone 9. No areas within the 100-year floodplain are depicted on Federal Emergency Management Agency (FEMA) mapping for these islands.

NAPR also includes a concrete-lined, 46.1 million-gallon raw water reservoir, located to the west of FDR Drive. Water is stored at an elevation of approximately 47 feet MSL. The stored water is supplied via a transmission main from the Rio Blanco watershed, under a 1942 agreement. This agreement will be void with the Navy's disposal of NAPR. This manmade feature is within Zone 4.

### **Water Quality Classifications, Uses, and Standards – Surface Water**

The EQB designates water quality classifications for Puerto Rico's coastal and estuarine waters, surface waters, and groundwaters, pursuant to the environmental laws of Puerto Rico. Water quality designations are specified in the Puerto Rico Water Quality Standards Regulation, as amended (Commonwealth of Puerto Rico Environmental Quality Board March 2003).

Coastal and estuarine waters at NAPR are designated as Class SB (Feliberty 2004). Class SB waters are "coastal waters and estuarine waters intended for use in primary and secondary contact recreation, and for propagation and preservation of desirable species, including threatened or endangered species" (Puerto Rico Water Quality Standards Regulation, Section 3.2.2 (A)). Section 3.2.2(B) lists the standards for dissolved oxygen, coliform, pH, color, turbidity, taste- and odor-producing substances, sulfates, and surfactants that must be met in order to ensure the desired use of these waters.

Surface waters at NAPR are designated Class SD (Feliberty 2004). Class SD waters are “surface waters intended for use as a raw source of public water supply, propagation and preservation of desirable species, including threatened or endangered species, as well as primary and secondary contact recreation.” Primary contact recreation may be excluded in streams or stream segments that do not comply with standards for this classification (Puerto Rico Water Quality Standards Regulation, Section 3.2.4 (A)). Section 3.2.4(B) lists the standards for dissolved oxygen, coliform, pH, color, turbidity, total dissolved solids, taste- and odor-producing substances, total phosphorus, sulfates, surfactants, chlorides, pathogenic organisms, and total ammonia that must be met in order to ensure the desired use of these waters.

### **3.5.2 Groundwater**

The majority of residents in Puerto Rico obtain their water supply from six surface water reservoirs. Although only about 16% obtain water from groundwater, the natural chemical quality of water in these aquifers is suitable for most uses. Groundwater is generally a calcium magnesium biocarbonate type, which causes the water to be very hard (U.S. Geological Survey 2002).

The principal aquifer in the NAPR area is an alluvial valley aquifer, consisting of beds of clay, sand and gravel, and rock fragments to a depth of 98 feet or less (Gomez-Gomez and Heisel 1980). Yield of wells in the alluvium are commonly 50 to 150 gallons per minute (gpm) (U.S. Geological Survey 2002).

Volcaniclastic, igneous, and sedimentary aquifers of Cretaceous and Tertiary age are also present in the area. Compared to the alluvial aquifers, these are of minor importance and yield because water is stored and transmitted in fractures in the rock. Wells completed in these aquifers typically yield less than 10 gpm (U.S. Geological Survey 2002).

### **Water Quality Classifications, Uses, and Standards - Groundwater**

The EQB designates water quality classifications for Puerto Rico’s coastal and estuarine waters, surface waters, and groundwaters, pursuant to the Environmental Policy Act (Law No. 9 of June 18, 1970, as amended). Water quality designations are specified in the Puerto Rico Water Quality Standards Regulation, as amended, March 2003.

Groundwaters at NAPR are designated SG2 (Feliberty 2004). Class SG2 waters “include groundwaters which due to high total dissolved solids concentration (concentrations greater than 10,000 mg/L [milligrams per liter]) are not fit as a source of drinking water supply even after treatment.” No uses or standards are designated for Class SG2 groundwaters.

## **3.6 Climate and Air Quality**

### **3.6.1 Climate**

NAPR has a tropical-marine climate characterized by minimal temperature fluctuations, relatively moderate humidity, and frequent rain showers. The annual mean temperature is 79.9 degrees Fahrenheit (°F). July and August are the warmest months (82.4°F) and February is the coldest month (76.8°F). Easterly trade winds, which persist throughout the year, have a substantial moderating effect on the tropical heat. The relative humidity averages 65% to 78%.

Rainfall in Puerto Rico varies considerably from place to place but generally consists of brief showers that occur frequently throughout the year. The average annual rainfall on NAPR is approximately 58 inches. The rainy season is typically defined as May through November, when monthly rainfall averages between 4.08 and 7.64 inches. However, significant rainfall events have also been recorded during December (e.g., 16.05 inches in 1981, 10.11 inches in 1975). In addition, it should be noted that areas immediately west and north of NAPR routinely receive approximately 70 to 100 inches annually. These areas include portions of the Rio Daguao watershed, the lower part of which encompasses lands within NAPR (Ecology and Environment, Inc. 1987). The hurricane season is from June 1 through November 30; maximum winds exceed 95 knots during severe hurricanes. An average of two tropical storms per year occur in the general area of NAPR, one of which usually reaches hurricane intensity.

Rainfall on Piñeros and Cabeza de Perro islands generally consists of brief showers throughout the year. The average rainfall is approximately 50 inches; rain clouds approaching NAPR from the east tend to move in a path that takes them north of the islands.

### 3.6.2 Air Quality

The Clean Air Act (CAA) is the main federal statute governing the control of air pollution. The CAA designates six pollutants as “criteria pollutants”: respirable particulate matter, carbon monoxide, sulfur dioxide, nitrogen dioxide, lead, and ozone. Primary and/or secondary National Ambient Air Quality Standards (NAAQS) have been established to protect public health and welfare and to account for the effect of air pollution on soil, water, visibility, vegetation, and other materials exposed to air pollution. These standards are shown in Table 3-1. Areas where monitoring data show that one or more NAAQS are exceeded per year are designated as “non-attainment” for that pollutant.

The CAA requires state or local air quality control agencies to adopt State Implementation Plans (SIPs). An SIP prescribes measures to eliminate or reduce the severity and number of NAAQS violations and to achieve and/or maintain attainment of these standards. Typical SIP measures include permit regulations, emission standards for new or modified air pollution sources, and procedures for evaluating the impact of proposed emission sources. Major programs included in an SIP are the New Source Review (NSR) program (including prevention of significant deterioration review for sources located in attainment air quality areas); the Title V Operating Permit program for existing sources; and National Emission Standards for Hazardous Air Pollutants (NESHAPs), including maximum achievable control technology standards.

**Table 3-1 National and Puerto Rico Ambient Air Quality Standards (40 CFR 50)**

Pollutant	Averaging Time	Primary Standard (:g/m <sup>3</sup> )	Secondary Standard (:g/m <sup>3</sup> )
Ozone (O <sub>3</sub> )	1 Hour	235	235
	8 hours	157	157
Carbon monoxide (CO)	1 hour	40,000	—
	8 hours	10,000	—
Nitrogen dioxide (NO <sub>2</sub> )	Annual	100	100
Fine particulate matter (PM <sub>2.5</sub> )	24 hours	65	65
	Annual	15	15
Lead	Calendar quarter	1.5	—
Respirable particulate matter (PM <sub>10</sub> )	24 hours	150	150
	Annual	50	50
Sulfur dioxide (SO <sub>2</sub> )	3 hours	—	1,300
	24 hours	365	—
	Annual	80	—

NAPR is within the single air quality control region (AQCR) that covers Puerto Rico, including Vieques. Based on ambient monitoring data collected mainly in the vicinity of San Juan by the Puerto Rico EQB, the EPA classifies the AQCR as in attainment for all criteria pollutants (<http://www.epa.gov/air/data/index.html>). Therefore, air pollutant concentrations are considered to be below NAAQS for all criteria pollutants.

Under the 1990 CAA Amendments (42 United States Code [USC] 7476[c]), federal actions are required to conform to the applicable SIP. The criteria and procedures used to demonstrate conformity are explained in 40 CFR 51 (“Requirements for Preparation, Adoption, and Submittal of Implementation Plans”) and 40 CFR 93 (“Determining Conformity of Federal Actions to State or Federal Implementation Plans”).

Currently, regulations for implementing the General Conformity rule have been promulgated only for non-attainment areas (i.e., AQCRs where pollutant concentrations exceed NAAQS). Because Puerto Rico is classified as in attainment of the NAAQS for all pollutants, the General Conformity rule is not applicable in the Puerto Rico AQCR.

The major federal regulations potentially affecting NAPR (depending on the emission capacity of sources) are the Title V operating permit program, the NSR program, and New Source Performance Standards (NSPS) regulations for new or modified source construction. These federal regulations have been delegated to the Commonwealth of Puerto Rico, where the Puerto Rico EQB has the authority to administer the federal regulations. Puerto Rico’s air quality regulations are contained in “Regulations for the Control of Atmospheric Pollution” promulgated by the EQB.

The Puerto Rico EQB issued a draft Title V Operating Permit, number TV9711-19-0397-0012, to NSRR in spring 2003. A final Title V Operating Permit has not yet been issued by the EQB.

NAPR has a wide variety of small emission sources, which operate intermittently, with no set operation schedule. Most emissions are generated by combustion sources powered by diesel, jet propellant (JP)-5, gasoline, or propane gas. During full station operations, the combined emissions from these combustion sources had the potential to emit more than 100 tons per year of nitrogen oxides (NO<sub>x</sub>), CO, and volatile organic compounds (VOCs), making the former NSRR a major stationary source of criteria pollutants. The internal combustion generators that supply energy in emergencies are considered insignificant sources because each one operates less than 500 hours per year.

VOCs and hazardous air pollutants (HAPs) were also generated in painting activities, cleaning operations associated with aircraft and ship maintenance and repair, and other day-to-day activities. Significant emission units at NSRR included boilers, machine parts cleaning, engine testing, fuel storage tanks, and painting operations. Because of the reduction in station activity, many of the air emission sources associated with aircraft and boat maintenance have been discontinued.

As a condition of the permit, the former NSRR was required to retain records of all required monitoring data and support information for five years from the date of the monitoring sample, measurement, report, or application. There is no documentation of any current or previous Notice of Violation (NOV) issued to NAPR as a result of a deviation from the Title V Permit.

### **3.7 Noise**

The inactivity at the airfield and port facilities, as well as the reduction of personnel and operational tempo at NAPR, have reduced the ambient noise levels to levels below that of the neighboring communities of Ceiba and Naguabo.

When the installation was in operation, noise was generally attributable to aircraft, vehicles, and watercraft. Operations at Ofstie Airfield were the major source of noise. Ofstie has one operational runway and two helipads. In calendar year 2000, more than 27,393 air operations were conducted at NSRR and included fixed-wing and rotary-wing arrivals, departures, patterns, and maintenance operations. The vast majority of the operations were conducted during the hours of 6:00 to 23:00; few operations were conducted during nighttime hours.

A 1997 noise study for NSRR updated an earlier 1986 study. The 1997 study shows that day-night sound levels (Ldn) on-base ranged from 60 to 85 A-weighted decibels (dB[A]) while the base was in operation. Noise levels in this range are typical for developed industrial areas. With the closure of NSRR, noise emissions at NAPR have been drastically reduced.

## **3.8 Terrestrial Environment**

### **3.8.1 Vegetation**

The coastal area of Puerto Rico near Ceiba, including NAPR, is classified as a subtropical dry forest ecological life zone (Ewel and Whitmore 1973). Historical land



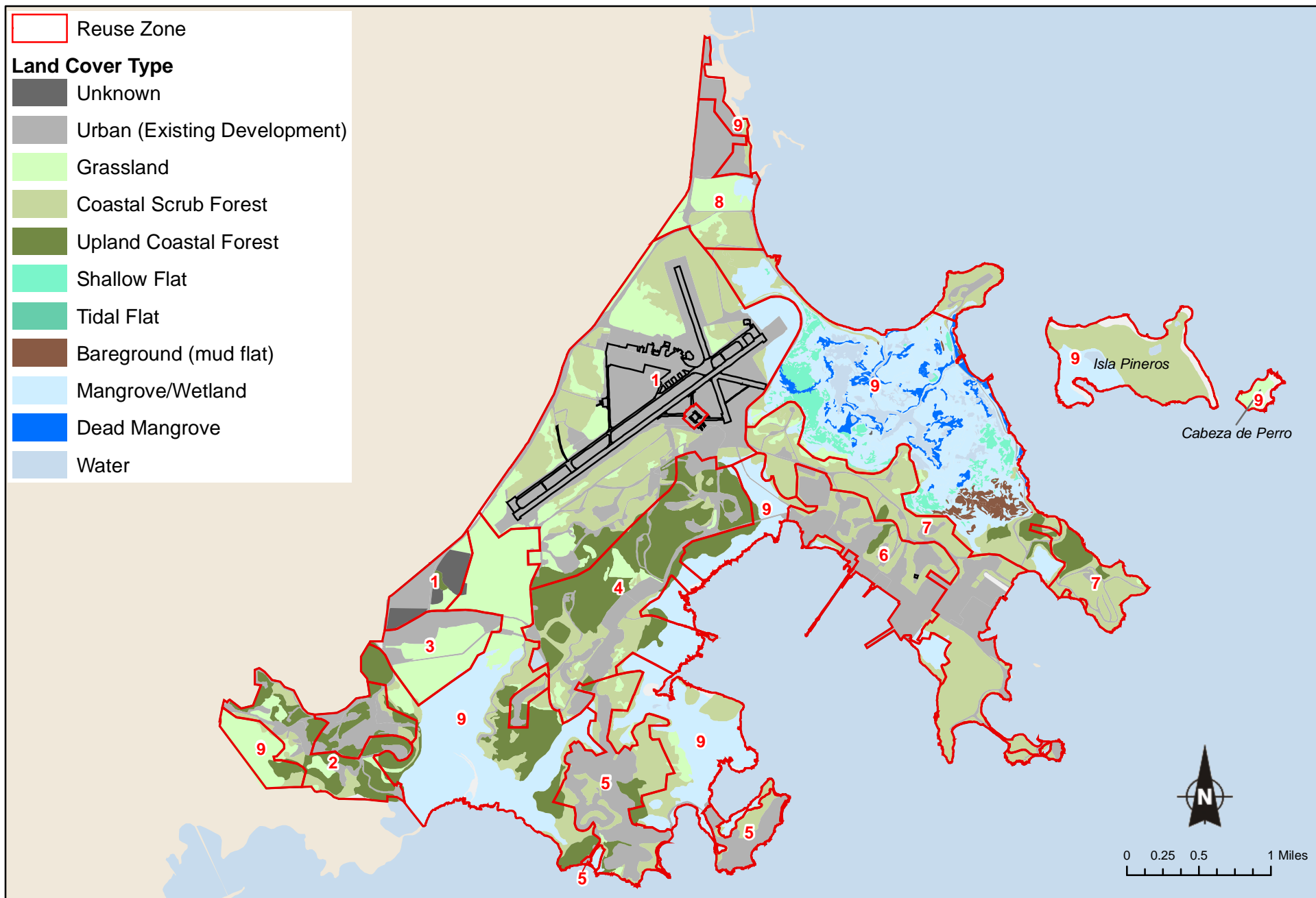
use of the property, which has included grazing and development associated with NAPR, has led to the replacement of the historic climax upland community with scrub/forest communities (see Figure 3-8).

Approximately 2,500 acres of land at NAPR have been developed and are currently maintained. The remainder of the base comprises unimproved (4,500 acres) and semi-improved (1,400 acres) areas with various terrestrial, marine, and transitional communities (U.S. Navy 2004).

Terrestrial communities at NAPR include coastal scrub forest, upland coastal forest, grassland, and freshwater wetlands (wet coastal scrub forest and wet meadow). Wetland communities—transitional areas between marine and terrestrial environments—have been divided into freshwater and tidal wetland communities. Freshwater wetlands have been included in this discussion of terrestrial communities. Tidal wetland communities are discussed as mangroves in Section 3.9, Marine Environment. Cover types at NAPR are depicted on Figure 3-8.

The majority of the undeveloped terrestrial areas at NAPR are characterized as coastal scrub forest communities. The secondary growth of thick scrub is dominated by leadtree (*Leucaena spp.*), box briar (*Randia aculeate*), sweet acacia (*Acacia farnesiana*), and Australian corkwood tree (*Sesbania grandiflora*) that grew in areas that were cleared for grazing prior to acquisition by the Navy. Tree species include ucar (*Bucida buceras*), sandbox (*Hura crepitans*), figs (*Ficus sp.*), flamboyant tree (*Delonix regia*), Puerto Rican royal palm (*Roystonea borinquena*), giné (*Melicoccus bijugatus*), and Indian almond (*Terminalia catappa*) (U.S. Navy 1998). Tree heights rarely exceed 50 feet and the vegetation has minimal commercial value, but it does provide erosion protection and promotes groundwater recharge, providing valuable watershed protection (U.S. Navy 2004).

Coastal scrub forest is the dominant vegetative community on Isla Piñeros. Other communities on Isla Piñeros include mangroves, open water lagoons, and other tidal communities. Grassland is the dominant community at Cabeza de Perro. The vegetation in the zones at NAPR varies, depending on topography.



Source: Geo-Marine, 2005; ESRI, 2004

**Figure 3-8**  
**Vegetative Communities and Land Cover**  
**Naval Activity Puerto Rico**

- **Zone 1.** Zone 1 is dominated by the existing airfield. Undeveloped areas in Zone 1 include coastal scrub forest, grassland, and upland coastal forest.

Some freshwater wetlands lie within the outline of Zone 1. Many of the wetlands are associated with drainage streams that enter the property from the developed areas to the west and are prone to flooding. (These surface water features are discussed above in greater detail in Section 3.5, Hydrology and Water Quality). These wetland areas have been excluded from Zone 1 and are included as part of Zone 9, the conservation areas. Scrub forests, which are not excluded from Zone 1, surround many of these wetland areas. Scrub vegetation helps to stabilize these areas and protect against erosion. Los Machos forest, a tidal wetland complex that includes mangroves, shallow flats, tidal flats, mud flats, and open water that are associated with Puerto Medio Mundo and Pasaje Medio Mundo, which lie along the eastern boundary of Zone 1. There is no undeveloped buffer in Zone 1 between existing development and these tidal and marine resources.

- **Zone 2.** Undeveloped areas include approximately upland coastal forest, grassland, and coastal scrub forest.

No freshwater wetlands lie within the outline of Zone 2. However, freshwater wetlands lie along the west and northeast boundary of Zone 2. These wetland areas have been excluded from Zone 2 and are included as part of Zone 9, the conservation areas. The Dagua forest, a mangrove forest, lies along the eastern border of Zone 2 and is also included as part of Zone 9. Undeveloped grassland, scrub, and forest areas within Zone 2 act as a buffer between these sensitive resources and existing development.

- **Zone 3.** Undeveloped areas in Zone 3 include grassland, upland coastal forest, and coastal scrub forest.

Freshwater wetlands lie along the northern, eastern, and southern borders of Zone 3, in association with the Rio Dagua drainage system. This is the largest freshwater wetland complex at the facility and is subject to flooding during storm events. (Surface water features are covered in greater detail in Section 3.5.1). These resources are included as part of Zone 9. Grassland, forest, and scrub vegetation in Zone 3 slow surface water runoff to these wetlands and to the Rio Dagua.

- **Zone 4.** Undeveloped areas in Zone 4 include upland coastal forest, scrub forest, and grassland.

No freshwater wetlands lie within the outline of Zone 4. However, freshwater wetlands associated with the Rio Dagua drainage system lie along the western border of Zone 4. These freshwater wetland resources are included in Zone 9. Enseñada Honda and associated mangroves border Zone 4 to the east and the Dagua forest lies along the western border of Zone 4. Based on the outline of Zone 4 in the Reuse Plan, portions of the Enseñada Honda man-

groves in the vicinity of Langley Drive and portions of the Daguafo forest in the vicinity of the elementary school are included within the outline of Zone 4. The remainder of the tidal communities adjacent to Zone 4 are included in Zone 9. Scrub and forest vegetation slow surface water flow and trap sediment and contaminants. Forest and scrub vegetation in Zone 4 act as a buffer zone for adjacent freshwater, tidal, and marine ecosystems. Vegetation slows surface water movement during storm events and allows excess surface water to infiltrate to groundwater. This infiltration provides protection against erosion on the slopes and protects the existing residential and commercial area at the foot of the slopes from potential flooding.

- **Zone 5.** Undeveloped areas include coastal scrub forest, upland coastal forest, and grassland.

No freshwater wetlands lie within the outline of Zone 5. However, freshwater wetlands lie along the eastern boundary of Zone 5. These wetlands are part of a larger wetland complex that includes mangroves and open water areas associated with Enseñada Honda. Bahía Cascajo lies along the south border of Zone 5. The Daguafo mangrove forest lies along the western boundary of Zone 5. The Reuse Plan indicates that portions of the Daguafo forest in the vicinity of FDR Drive are included within the outline of Zone 5. The remaining wetland areas adjacent to Zone 5 are included in Zone 9. Forest and scrub vegetation in Zone 5 provide a buffer between existing development in Zone 5 and these sensitive wetland and marine ecosystems. (The marine environment is discussed in greater detail in Section 3.9.)

- **Zone 6.** Undeveloped areas include coastal scrub forest, upland coastal forest, and grassland.

No freshwater wetlands lie within or adjacent to Zone 6. Enseñada Honda lies along the southern border of Zone 6. Mangroves associated with Enseñada Honda lie along the western and southeastern boundary of Zone 6. The Reuse Plan shows a small portion of the Enseñada Honda mangrove in the vicinity of Pier 3 within the outline of Zone 6. No buffer vegetation exists in Zone 6 between existing development and these marine and tidal ecosystems.

- **Zone 7.** Undeveloped areas include coastal scrub forest, upland coastal forest, and grassland.

No freshwater wetlands lie within or adjacent to Zone 7. Zone 7 is bound to the north by the Los Machos forest, which is a tidal wetland complex that includes mangroves, shallow flats, tidal flats, mud flats, and open water and is associated with Puerto Medio Mundo and Pasaje Medio Mundo. Mangroves associated with Enseñada Honda lie along the western and southeastern boundary of Zone 7 and an additional mangrove area lies between Zone 7 and Bahía De Puerca. Marine environments adjacent to Zone 7 include Pasaje Medio Mundo, Bahía De Puerca, and Enseñada Honda. Areas within Zone 7 with scrub, forest, and grassland vegetation act as buffers for these sensitive tidal and marine ecosystems.

- **Zone 8.** Zone 8 is a mix of grassland, wet meadow, and wet coastal scrub forest communities, the majority of which are currently used for grazing. Existing development in this zone, approximately 7 acres, is limited to roadways.

Freshwater wetlands exist within and adjacent to Zone 8. In addition, the Demajagua forest, a wetland complex that includes freshwater wetlands and mangroves in association with Puerto Medio Mundo, lies along the eastern border of Zone 8.

- **Zone 9.** Parcels at the mainland that are included in Zone 9 are primarily freshwater and/or tidal wetland communities (mangroves and flats). Existing development in Zone 9 is limited to roadways.

### **3.8.2 Freshwater Wetlands**

Approximately 460 acres at the station are covered by palustrine habitat, which includes all freshwater wetlands. These wetlands include wet meadows and marshes dominated by cattails (*Typha* spp.) and grasses (*Panicum* spp. and *Paspalum* spp.) and wet coastal scrub forests (U.S. Navy 1998). The largest freshwater wetland is associated with the Rio Dagua drainage system in the southwest portion of the site. Other large freshwater wetlands are associated with Quebrada Aguas Clara, in the north portion of NAPR, and with an unnamed tributary to Quebrada Palma, in the southwestern portion of NAPR. Additional smaller freshwater wetlands are located around Oftsie airfield and at the landward edges of tidal wetland complexes. Wetlands are depicted on Figure 3-8; freshwater wetlands are depicted as wet meadow and wet coastal scrub forest. These freshwater wetlands serve as habitat for birds and reptiles, act as filters to trap sediments that could otherwise harm coral reefs and seagrass beds, and buffer the impact of flash flooding that results from steep slopes, torrential rains, and land use outside NAPR (U.S. Navy 1998).

### **3.8.3 Tidal Wetlands**

The majority of Zone 9 can be characterized as tidal wetland communities. Tidal wetlands occur throughout the base and include shallow flats, tidal flats, mud flats, mangroves, dead mangroves, and open water areas. These habitats are discussed in Section 3.9.4 and are depicted on Figure 3-8.

### 3.8.4 Wildlife

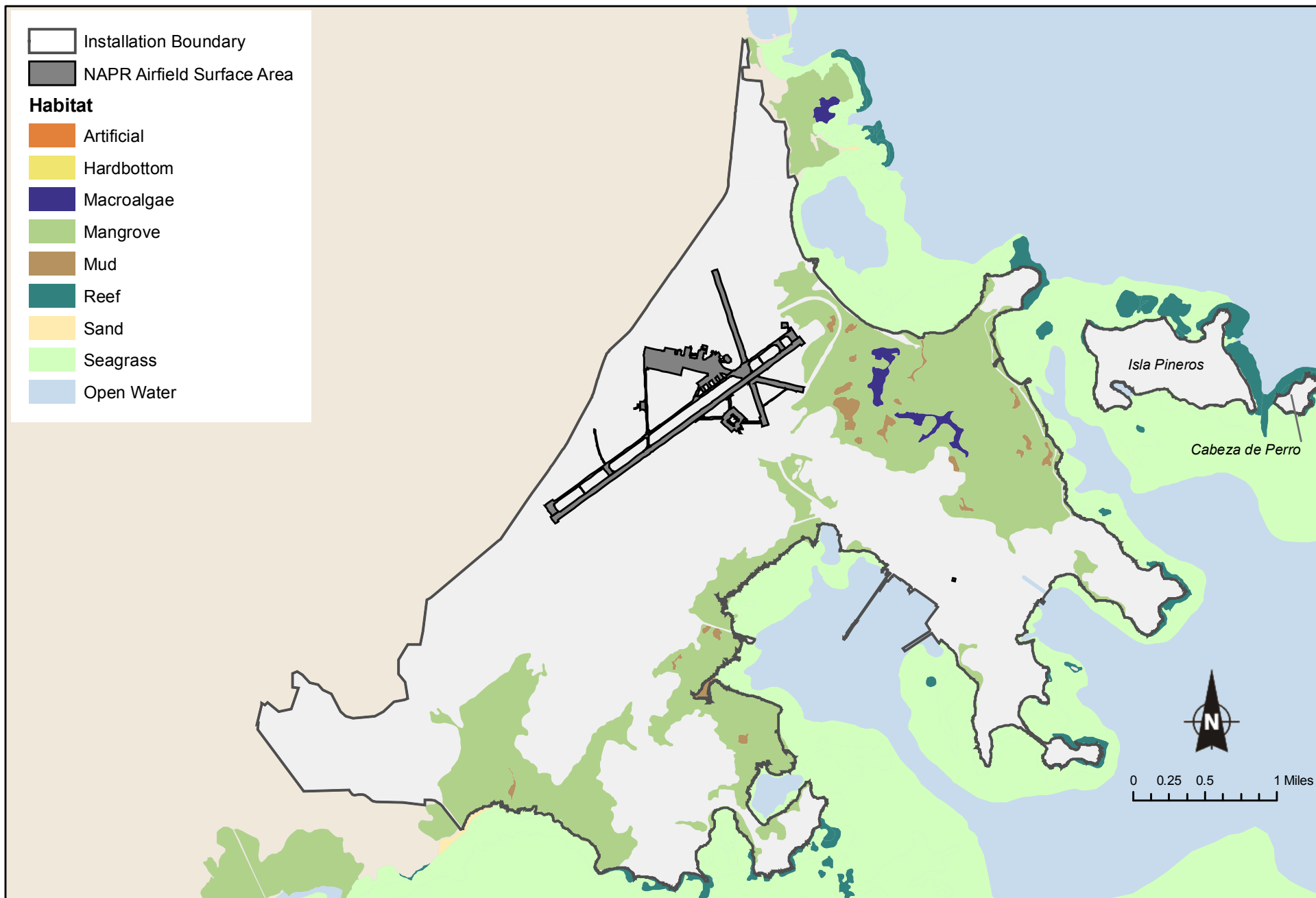
Wildlife at NAPR comprises multiple native reptile, amphibian, and avian species as well as a host of introduced mammal species. Approximately six species of snakes are known to occur at NAPR. Known snake species include the Puerto Rican boa (*Epicrates inornatus*), Virgin Island tree boa (*Epicrates monesis granti*), Puerto Rican racer (*Allophis portoricensis*), Puerto Rican garden snake (*Arrhyton exiguum*), common viper (*Typhlops richardi*), and beaked viper (*Typhlops rostellatus*) (U.S. Navy 1998). A large mongoose population has reduced the reptile population. Multiple terrestrial and seabird species use the beach strand, grassland, upland forest, and mangrove forest habitats at the station. Numerous species of frogs and toads occur, including the coqui, a small tree frog. The mammal population is predominantly made up of introduced species that include mongoose, dogs, cats, Norway and grey-bellied rats, and mice (U.S. Navy 2004).

## 3.9 Marine Environment

The marine environment adjacent to NAPR is typical of tropical, shallow, coastal waters (U.S. Navy 1998). Such waters are characterized by warm temperatures (i.e., 75°F to 84°F); stable salinities of 35 parts per thousand or slightly higher; moderately high physical energy from waves, currents, and tides; clear water that allows deep light penetration; lower concentrations (relative to temperate waters) of dissolved nutrients; and a high diversity of habitats and species. Marine habitats in the vicinity of NAPR include open water, coral reefs, seagrass beds, sandy beaches, and mangroves. The distribution of these habitats surrounding NAPR are shown in Figure 3-9.

### 3.9.1 Coral Reefs

The hardbottom marine habitats of Puerto Rico have been separated into two categories by the Caribbean Fishery Management Council (CFMC) and the National Ocean Service Biogeography Program (National Oceanic and Atmospheric Administration [NOAA] 2000a). *Coral reef and colonized hardbottom*, one category, is defined as a calcium carbonate substrate created by reef-building corals and other organisms, with colonization by live coral. The second of the two categories is *uncolonized hardbottom habitat*, which is described as substrate composed of relict deposits of calcium carbonate or exposed bedrock. Coral reef systems, including patch reefs, fringing reefs, and bank-barrier reefs, are usually dominated by one or more of the following stony coral genera:



Source: Geo-Marine, 2005; ESRI, 2004

**Figure 3-9**  
**Marine Habitat**  
**Naval Activity Puerto Rico**

Acropora, Agaricia, Diploria, Montastrea, Porites, and Siderastrea (National Oceanic and Atmospheric Administration 2000a; Caribbean Fishery Management Council 1994; Cowardin *et al.* 1979). In contrast, sponges, soft corals, or algae dominate low-relief hardbottom communities; reef-building corals are present to a lesser extent (Cowardin *et al.* 1979).

The total reef area located within the territorial waters (waters within 3 nautical miles [5.6 km] of mainland Puerto Rico) is approximately 193 square miles (500 square kilometers) (National Oceanic and Atmospheric Administration 1998). Most of the coral reefs near NAPR are relatively small patch reefs (Pace and Vega 1988) (see Figure 3-9). According to Pace and Vega, two of the most diverse reefs are located east of the Capehart officers' housing complex and off the north shore of Piñeros Island. A joint 1994-1995, USGS and Navy project, the Sirenia Project, mapped the nearshore habitats along the eastern coast of Puerto Rico near NAPR. Table 3-2 lists all coral reef types within the waters surrounding NAPR and their associated acreage cover.

**Table 3-2 Reef Habitat Types Present in Waters Surrounding Naval Activity Puerto Rico**

Reef Habitat Type	Area (Sq. Ft.)	Area (Acres)
Colonized Bedrock	11,601,651.34	266.34
Linear Reef	3,640,369.31	83.57
Patch Reef (Aggregated)	6,363,618.51	146.09
Patch Reef (Individual)	7,603,479.80	174.55
Scattered Coral-Rock	227,937.18	5.23
<b>Total</b>		<b>675.78</b>

Source: NOAA Biogeography Program at: <http://biogeos.noaa.gov/products/benthic/htm/data.htm>

Under Executive Order (EO) 13089 (Coral Reef Protection of June 11, 1998), U.S. federal agencies must identify actions that may affect U.S. coral reef ecosystems, use programs and authorities to protect and enhance the conditions of such ecosystems and, to the extent permitted by law, ensure that any authorized or funded actions will be carried out so as to not degrade the conditions of such ecosystems. U.S. coral reef ecosystems in Puerto Rico have also been designated as essential fish habitat (EFH) by the CFMC pursuant to the requirements of the Magnuson-Stevens Fishery Conservation and Management Act.

In general, impacts on coral reefs and hard-bottom habitats may originate from human activity such as commercial and recreational fishing, upland deforestation (which



results in siltation of reefs), pollution, and tourist-related activities such as anchoring, littering, trampling, and diver damage (National Oceanic and Atmospheric Administration 2000b). Caribbean reef ecosystems have also been impacted by natural disturbances such as hurricanes (Vicente *et al.* 1991) and algal blooms.

Coral reefs in Puerto Rico have been documented as the most rich in the U.S. Caribbean, with 237 coral-like species (Australian Institute of Marine Science 2004). The reefs considered the healthiest and most-developed reefs within Puerto Rico are along the western coast near Descheo Island. The reefs located along the eastern coasts of Puerto Rico are not as healthy nor as well developed, which can be attributed to factors such as environmental stresses from human activity. Another factor that has contributed to coral reef quality along the eastern coast is tropical cyclones. Typically, the reefs lying along the western coast of Puerto Rico are leeward of the island, which protects them from the peak wave energies of tropical cyclones. However, the eastern coast reefs are typically windward of the island and consequently bear the brunt of wave energy during a tropical cyclone. Smith *et al.* (1996) indicates that as much as 85% of live elkhorn cover on the reefs at nearby Buck Island was lost due to Hurricanes David and Frederic, with further immeasurable damage resulting from Hurricane Hugo. Elkhorn is the primary reef building coral in the Caribbean. The USGS reports indicate that Hurricane Hugo devastated the eastern-lying corals along Puerto Rico, while only minor impacts occurred along the western reefs. However, in spite of the devastation, some reefs in the eastern areas show signs of healthy re-growth.

### **3.9.2 Fish and Shellfish**

The coastal waters of the Caribbean contain a diversity of fish. Approximately 350 species of fish are known to occur in the waters around Puerto Rico (Ecology and Environment, Inc. 1986). In general, the fish can be divided into three different associations, based on their preferred habitat. These associations include fish inhabiting the sea-grass beds and sandflats, those inhabiting coral reefs, and open water or pelagic fish. There is overlap among the associations, as some fish in one association also use habitats in another. In the nearshore waters around nearby Vieques, the reef fish are the most diverse and abundant fish association. The Puerto Rico DNER is responsible for managing fisheries in the coastal waters of Puerto Rico under Commonwealth Law No. 278 (November 29, 1998) and associated fisheries regulations and Administrative Orders.

Pursuant to the 1996 reauthorization of the Magnuson-Stevens Fishery Conservation and Management Act (16 USC 1801 et seq., Public Law 104-208) and Department of Commerce regulations (50 CFR 600.905 – 930), all activities or proposed activities, authorized, funded, or undertaken by a federal agency must consider adverse impacts on EFH. The Act defines EFH as the waters and substrate necessary to fish for spawning, breeding, feeding, and growth to maturity. An adverse impact as defined in the EFH rules is “any impact which reduces quality and/or quantity of EFH. . . . [and] may include direct, indirect, site-specific or habitat wide impacts, including individual, cumulative, or synergistic consequences of actions.” The November 1999 *Essential Fish Habitat Consultation Guidance* (National Marine Fisheries Service [NMFS] 1999) states that when an agency determines that its activities may have an adverse effect on EFH, consultation with the NMFS is required. Goals of the consultation process are to ensure that federal agencies consider the effects of their actions on important habitats and, as a result, contribute to the sustainable management of marine fisheries. The Navy conducted an EFH Assessment for the support of the disposal of NAPR in February 2005 (Geo-Marine, Inc. September 2005), which is included in this EA as Appendix B.

The CFMC has developed four fishery management plans for the Caribbean region: Spiny Lobster, Shallow Water Reef Fish, Corals and Reef Associated Plants and Invertebrates, and Queen Conch Fishery Management Plans (FMPs) (Caribbean Fishery Management Council 1996, 1994, 1985, and 1984). Since the development of the FMPs, the CFMC has identified EFH for numerous species. The ecologically diverse area encompassed by identified EFH includes habitat essential for fish spawning, breeding, feeding, and growth to maturity and consists of all waters and substrates surrounding NAPR, including coral reefs, seagrasses, and mangroves. These habitats provide important spawning, nursery, forage, and refuge habitat for a variety of commercially and recreationally important finfish and shellfish, including juvenile and adult mutton snapper, juvenile yellowtail snapper, and adult squirrelfish (see Geo-Marine, Inc. September 2005 and the National Oceanic and Atmospheric Administration Letter to the Navy, May 28, 2004 in Appendix A).

### **3.9.3 Seagrass Beds**

Seagrass beds are among the most productive of all natural systems in the world (Wiley and Vilella n.d.). Seagrass beds are important in controlling and reducing erosion

by trapping and consolidating bottom sediments with their extensive root and rhizome network. They also promote the accumulation of organic matter that is used by resident organisms. They provide nutrients, energy, and habitat (e.g., nursery grounds for larval and juvenile life stages) for fish and numerous marine invertebrates (Kaplan 1988; Vicente 1992). Seagrass beds are an important food source for various fish, sea turtles, and the endangered West Indian manatee (*Trichechus manatus*), which feeds on the roots, rhizomes, and leaves of seagrasses (Wiley and Vilella n.d.). As noted above, seagrass beds have been designated as EFH because they provide important spawning, nursery, forage, and refuge functions for a variety of commercially and recreationally important finfish and shellfish.

Seagrasses generally grow in protected areas such as bays or coves with slow currents and moderate wave action and are often found near protective barrier reefs (Kaplan 1988). Seagrass meadows in the Caribbean are frequently associated with coral reefs. In many cases seagrass meadows and coral reefs can be highly interconnected. By trapping sediments, seagrass meadows prevent sediment re-suspension and transport onto the adjacent reefs. In turn, reefs protect seagrass meadows by dissipating wave energy.

The four species of seagrasses that occur on the shelf surrounding the main island of Puerto Rico are turtle grass (*Thalassia testudinum*), manatee grass (*Syringodium filiforme*), shoal grass (*Halodule wrightii*), and paddle grass (*Halophila decipiens*) (Kaplan 1988). Turtle grass is probably the most abundant seagrass species in Puerto Rico and its islands (Vicente 1992; Reid and Kruer 1998). The abundance of seagrass beds varies around the various coasts of Puerto Rico. There is very little seagrass growth (<5%) along the north and west coasts of Puerto Rico because of wave action, the narrow insular shelf, and silt-laden river runoff (Vicente 1992). There are large areas of manatee and turtle grass beds along the southwest, south, and east coasts of Puerto Rico where there is a wide, shallow shelf, a coastline protected from heavy wave action, and reduced river runoff (Vicente 1992). A large area of seagrass beds covers the seafloor between the southeast coast of Puerto Rico and Vieques (Reid and Kruer 1998).

Within the waters surrounding NAPR seagrass beds occur along most shorelines (see Figure 3-9). There are four main areas of seagrass beds: one in the lagoon north of Los Machos mangrove forest; one encircling Isla Piñeros; another around the point of Isla Cabras and Enseñada Honda; and the fourth a broad area from Punta Cascajo south and east to Vieques.

The lagoon area seagrass beds are mostly continuous seagrass, with smaller amounts of seagrass beds of lesser percentages of cover. A sparsely covered seagrass bed along the beach area has approximately 10% to 30% cover. The seagrass beds around Isla Piñeros are mostly continuous seagrass beds. Very small areas of lesser seagrass cover occur nearer to the shoreline. The same can be said for the last two remaining seagrass bed areas.

The main sources of impact that threaten seagrasses and the seagrass habitat of Puerto Rico include raw sewage discharge, agricultural runoff, coastal construction (which creates turbidity that obstructs incident light), pipe placement (e.g., telephone, water, electricity), mechanical impacts (e.g., anchoring, propeller plowing/scarring, ship grounding), silt-laden runoff (from upland and coastal deforestation/land clearing), sand burial and turbidity following storms and hurricanes, and disease (Caribbean Fishery Management Council 1998; Sullivan-Sealy and Bustamante 1999).

### **3.9.4 Mangroves**

Mangroves are collectively designated as an assemblage of salt-tolerant trees or bushes that colonize low energy depositional environments and waterlogged, oxygen deficient, and saline soils within the tropics (Cintrón 1987). Mangroves occur in all coastal regions of mainland Puerto Rico (Caribbean Fishery Management Council 1998). There are 35 square miles (92 square kilometers) of mangrove forest in Puerto Rico and its islands (Spalding *et al.* 2001).

Four species of mangrove trees occur in Puerto Rico: red mangrove (*Rhizophora mangle*), white mangrove (*Laguncularia racemosa*), black mangrove (*Avicennia germinans*), and button mangrove (*Conocarpus erectus*). The salt-tolerant mangrove trees grow in coastal and estuarine environments. Mangrove forests of Puerto Rico are classified as fringe, riverine, basin, or overwash types according to their position in the landscape and the pattern of water circulation (Lugo and Snedaker 1974, as cited in Pace and Vega 1988). The first three types are present on NAPR.

Mangrove forests contribute a vital component to the estuarine food chain through the decomposition of organic material and the release of organic and inorganic nutrients (Cintrón 1987). In addition to a source of nutrition, mangrove roots and branches provide cover and protection for wildlife and fish/shellfish, particularly as spawning grounds and nurseries. Mangrove inhabitants include various invertebrates (e.g., sponges, crabs, tuni-

cates, bivalves, and spiny lobsters) and fishes (e.g., bluestriped grunt, sailors choice, gray snapper, dog snapper, common snook, and jewfish). Mangroves aid in the prevention of coastal erosion and act as a buffer for major storm events. Additionally, mangroves filter upland runoff and thereby release higher quality water to the ocean. It was previously noted in this EA that the mangroves have been designated as EFH.

Mangrove forests comprise about 2,100 acres of NAPR (U.S. Navy 1996), i.e., approximately 14% of the mangrove forests in Puerto Rico (U.S. Department of the Interior 2004) (see Figure 3-9) and 25% of NAPR. Pace and Vega (1988) grouped the mangrove forests into five main tracts: Demajagua, Los Machos, Enseñada Honda, Dagua, and Isla Piñeros. Descriptions of these mangrove tracts are provided in Pace and Vega (1988).

The Los Machos mangroves are located in the northeast portion of NAPR and cover about 1,000 acres. This mangrove complex has been impacted over time by events such as base construction in the 1940s, construction of Lake Chamberlain Road (which reduced tidal circulation in the forest), oil spills, and hurricanes (U.S. Navy 1996). An ecological and hydrological restoration plan was developed for the mangrove complex in 1996 (U.S. Navy 1996). Los Machos mangroves are also the subject of a *Damage Assessment and Restoration Plan Environmental Assessment* (U.S. Navy October 2004). The plan was prepared to address the restoration of the natural resources and their functions that were damaged by a jet propellant-5 (JP-5) fuel spill that occurred in October 1999 at NSRR.

The main mangrove tracts have all been altered by human activities in some manner. Impoundment and dredge disposal are key contributors to mangrove alteration at NAPR. The Enseñada Honda mangrove tract has been impacted the most by dredge disposal. When harbor development began within Enseñada Honda, the dredge material was placed in the nearby mangrove forest, directly impacting approximately 40 acres of the mangrove forest.

### **3.10 Threatened and Endangered Species**

Threatened and endangered species are typically found primarily in less disturbed and more unique communities. Federally listed and Commonwealth-listed plant and animal species found at NAPR are included in Table 3-3.

**Table 3-3 Federally Listed and Commonwealth-listed Species on NAPR**

Common Name	Scientific Name	Federal Status	Commonwealth Status	Habitat Requirements
<b>Mammals</b>				
West Indian Manatee	<i>Trichechus manatus</i>	E	E	Marine, estuarine, and freshwater habitats, especially calm coastal waters with seagrass beds
<b>Reptiles</b>				
Puerto Rican boa	<i>Epicrates inornatus</i>	E	E	Forested Areas
Hawksbill turtle	<i>Eretmochelys imbricata</i>	E	E	Marine areas
Leatherback turtle	<i>Dermochelys coriacea</i>	E	E	Marine areas
Green turtle	<i>Chelonia midas</i>	T	T	Marine areas
Loggerhead turtle	<i>Caretta caretta</i>	T	T	Marine areas
Virgin Islands tree boa	<i>Epicrates monensis granti</i>	E	E	Forested Areas
<b>Birds</b>				
Yellow-shouldered blackbird	<i>Agelaius xanthomus</i>	E	E	Mangrove forests-arid thickets.
Brown pelican	<i>Pelecanus occidentalis</i>	E	E	Salt bays, beaches, ocean areas
Peregrine falcon	<i>Falco peregrinus</i>	—	E	Nests on rocky cliffs
Least tern	<i>Sterna antillarum</i>	—	V	Sandy beaches of freshwater and bays
Piping plover	<i>Charadrius melodus</i>	T	T	Sandy beaches of freshwater and bays
Least grebe	<i>Tachybaptus dominicus</i>	—	T	Freshwater lakes streams, ponds and lagoons
West Indian whistling duck	<i>Dendrocygna arborea</i>	—	T	Fresh and salt water bodies, marshes, coastal forests
Caribbean coot	<i>Fulica caribaea</i>	—	T	Fresh and salt water bodies, marshes
Roseate Tern		T	E	
Snowy plover	<i>Charadrius alexandrinus</i>	—	V	Sandy beaches of fresh water and bays
<b>Plants</b>				
Cobana negra	<i>Stahlia monosperma</i>	T	T	Coastal plains, associated with mangroves and immediately landward side of mangroves

Key:

C = Candidate.  
E = Endangered.  
T = Threatened.  
V = Vulnerable.

### 3.10.1 Mammals

#### Marine Mammals

Marine mammals are protected under the Marine Mammal Protection Act of 1972 (USC 16, 31 §§ 1361-1421), and all federally listed endangered species, including marine mammals, are protected under the Endangered Species Act (16 USC §§ 1531-1544). Of the endangered/threatened marine mammals that may occur in Puerto Rico waters, only the West Indian manatee (*Trichechus manatus*) is known to occur in the waters of NAPR. The following marine mammals are listed by NOAA Fisheries as occurring in Puerto Rico ([www.nmfs.noaa.gov/pr/species](http://www.nmfs.noaa.gov/pr/species)), but they are not discussed in further detail in this EA because they are not known to occur close to NAPR (and hence would not be adversely impacted by the proposed action): blue whale (*Balaenoptera musculus*), Caribbean monk seal (*Monachus tropicalis*), finback or fin whale (*Balaenoptera physalus*), humpback whale (*Megaptera novaengliae*), sei whale (*Balaenoptera borealis*), and sperm whale (*Physeter macrocephalus*).

The West Indian manatee (*Trichechus manatus*), federally listed as endangered in 1985, is a large, slow-moving marine mammal with a preference for calm coastal waters with seagrasses and a source of freshwater. Manatees use seagrass beds for feeding and resting habitats; although they feed on various types of aquatic vegetation, seagrasses are their primary food source. Manatee habitat includes sheltered marine bays and shallow estuaries with access channels at least 6.6 feet (2 m) deep (Ecology and Environment, Inc. 2000). Manatees require abundant aquatic vegetation for feeding, proximity to deep channels for traveling, and quiet coves for shelter. A recovery plan was developed for the Puerto Rican population of manatees in 1986 that contains recommendations for research, conservation, and law enforcement (Rathbun and Possardt 1986).

Manatee populations in Puerto Rico waters have been documented in three aerial surveys conducted from 1978 to 1979, 1984 to 1985, and in 1993 (United Nations Environmental Program [UNEP] 1995); a radio tracking study conducted from 1992 to 1996 (Reid and Kruer 1998); and a year-long intensive study of manatee distribution and abundance (Woods *et al.* 1984). The majority of manatees seen were found along the southern and northeastern coasts of Puerto Rico, with one-third of the manatees occurring in the vicinity of NAPR (United Nations Environmental Program 1995). In the waters surrounding Vieques, one of the most heavily used areas is the extensive seagrass bed west

of Mosquito Pier on the northwest end of the island (Reid and Kruer 1998; Geo-Marine, Inc. June 2004). Observations of manatee movements, using radio- and satellite-tracking devices, have revealed that some individuals move back and forth between eastern Puerto Rico and Vieques (Reid and Bonde 1993, as cited in Geo-Marine, Inc. June 2004). The number of manatees inhabiting the waters of Puerto Rico is not known, but the number of manatees counted during USFWS surveys has ranged from 43 to 101 (Geo-Marine, Inc. September 2005).

The *Manatee Assessment and Condition Summary for Naval Activity Puerto Rico, Interim Report* (Geo-Marine, Inc. June 2004) presents a map showing historical manatee sightings in eastern Puerto Rico, including Vieques. This figure, shown here as Figure 3-10, includes most of the monitoring studies mentioned above. Manatees are often concentrated at NAPR in the shallow coves and bays containing seagrasses (Geo-Marine, Inc. June 2004). Feeding manatees are most often recorded in Pelican Cove and Enseñada Honda, both of which contain seagrasses (see also Figure 3-9). Some of the data points in Figure 3-10 are from the USFWS; several records of manatees in Enseñada Honda were in the summary data provided by the USFWS to the Navy. These data included notes on the behavior of the manatees recorded. Out of nine recorded manatee sightings, three of the manatees were feeding, three were traveling, one was engaged in social behavior with two other manatees, and two were recorded as unidentified behaviors. One of the traveling manatees was swimming with a calf. Of six recorded sightings in Pelican Cove, two were traveling and four were feeding. Three of these records of manatees feeding involved multiple manatees (i.e., two to five individuals).

During operation of NSRR, the ocean outfall from the Capehart WWTP was documented as a source of freshwater for manatees in the vicinity of the installation (as cited in Geo-Marine, Inc. June 2004: Powell *et al.* 1981; Rathbun *et al.* 1985; Lefebvre *et al.* 2001). Manatees have previously been observed using the Forrestal and Bundy WWTP outfalls for obtaining freshwater (Geo-Marine, Inc. June 2004). One potential concern related to the closure of NSRR was that the closure of the Capehart WWTP (and reduction and cessation of freshwater outflows) would potentially adversely affect the manatee. The Navy has coordinated with the USFWS on this issue, and the USFWS gave their approval for reduction of freshwater outflows. As of January 2005, freshwater outflow from the WWTP continued and was about 150,000 gallons per day. This flow is maintained primarily by the influx of rainwater into the system.



According to the USFWS *Recovery Plan for the Puerto Rico Population of the West Indian (Antillean) Manatee* (Rathbun and Possardt 1986), the potential sources of manatee mortality in Puerto Rico are different than those in Florida. The main source of manatee mortality from human actions in Florida is accidental boat collisions, while that in Puerto Rico is from entanglement in gill nets. The recovery plan notes that development and the related increase in boat traffic may have started affecting manatees along the southern coast of the island. The plan further states that there is no evidence that natural events (e.g., hurricanes), habitat loss, competition, disease, or natural predation cause significant mortality of manatees in Puerto Rico. A more recent report, however, indicated that from 1990 to 1995, collisions with watercraft accounted for the largest number of manatee deaths in Puerto Rico (Mignucci-Giannoni *et al.* 2000, as cited in Geo-marine, Inc. September 2005).

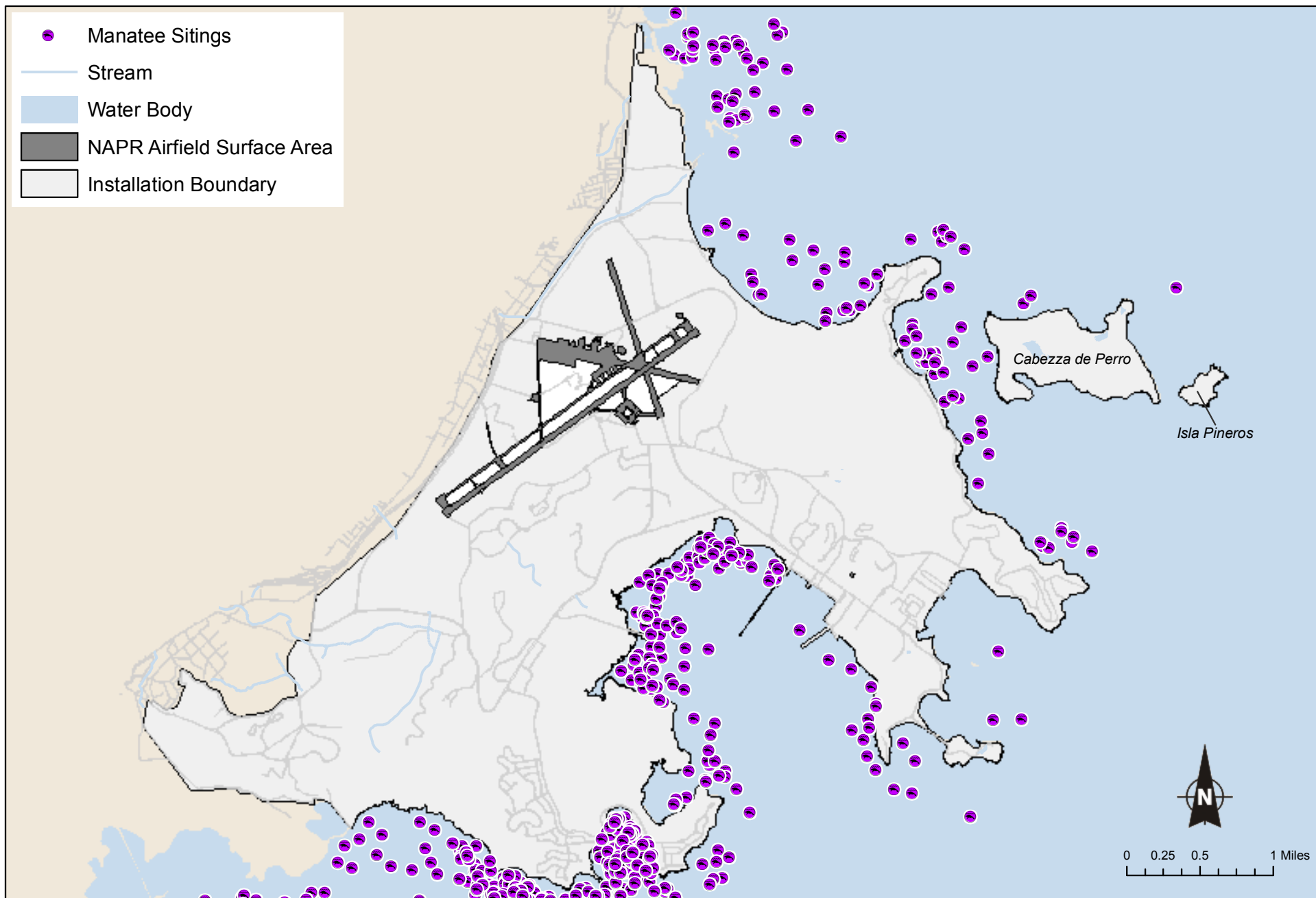
### **3.10.2 Reptiles**

Four species of sea turtles and two snake species listed as federal and Commonwealth threatened and endangered species are known to occur at NAPR.

#### **3.10.2.1 Sea Turtles**

Four species of sea turtle—leatherback (*Dermochelys coriacea*), green (*Chelonia mydas*), hawksbill (*Eretmochelys imbricata*), and loggerhead (*Caretta caretta*)—may be found in the waters adjacent to NAPR. All four species are federally listed as endangered species and are protected under the 1973 ESA (16 USC 1531-1544). Sea turtles use shallow-water marine benthic habitats such as seagrass beds and coral reefs for foraging and resting. Each species has a different preferred diet, but as a group they consume plants and animals such as seagrasses, mollusks, crustaceans, tunicates, jellyfish, and fish. Adult female sea turtles emerge from the water to nest. Nests are generally laid on sandy beaches along the shoreline landward of the mean high water line.

Rathbun *et al.* (1985) conducted aerial surveys in 1984 and 1985 along the coast of Puerto Rico, including NAPR (Figure 3-11). One-quarter of the sea turtles observed around the coast of Puerto Rico were in waters adjacent to NAPR. Of the sea turtles identified by species, the green accounted for the vast majority of the sightings, followed



Source: Geo-Marine, 2005; ESRI, 2004; USFWS, 2005;

**Figure 3-10**  
**Historical Manatee Sightings**  
**in Eastern Puerto Rico**

by the hawksbill, loggerhead, and leatherback. According to Pace and Vega (1988), areas adjacent to NSRR that are most frequently used by sea turtles include the east shore of Enseñada Honda Bay, the north coast of Piñeros Island, and the mouth of Cascajo Bay (Pelican Cove). Twenty-four percent of the sea turtle sightings in the waters of NAPR were in Enseñada Honda (with the majority along the eastern shore between the marina and the mouth of the bay [Rathbun *et al.* 1985; U.S. Navy 1995]). Another twenty-seven percent of the sightings in the waters of NAPR were in the Medio Mundo Passage. In this area, sea turtles were observed near Punta Medio Mundo, Punta Puerca, and areas in between.

Potential sea turtle nesting beaches at NAPR, as well as the zones proposed for development under the Reuse Plan, are shown in Figure 3-12. According to this map (prepared by NSRR in 2000), much of the beach surrounding Piñeros Island is noted as excellent potential nesting habitat for hawksbill and leatherback sea turtles, and various locations along the shoreline of NAPR are noted as excellent, suitable, or marginal (only one beach) potential nesting habitat for these two species (Diaz March 31, 2000). Several stretches of beach along the shoreline of Enseñada Honda are noted as suitable potential nesting habitat.

In the past few years, the Navy has been conducting weekly nesting surveys on these 33 potential nesting beaches. Data from the 2002 survey (conducted from April to December) are discussed in this section; data from 2004 (fewer surveys, from January to April) have also been collected and are shown in Table 3-4. In 2002, approximately 73 sea turtle nests were recorded on NAPR beaches (Geo-Marine, Inc. September 2005). Of the nests identified according to species, 46 were hawksbill nests, 2 were leatherback nests, 1 was a green sea turtle nest, and 24 remained unidentified. Nests were recorded at 12 of the 33 beaches; at some additional beaches only sea turtle tracks were recorded. As shown in Table 3-4 below, the vast majority of nests were recorded at beach #18 near the mouth of Enseñada Honda (to the northwest of Isla Cabras; see Figure 3-12 for beach locations) (Geo-Marine, Inc. September 2005). Depredation of 35 of the nests was noted. Six live turtles were also observed.

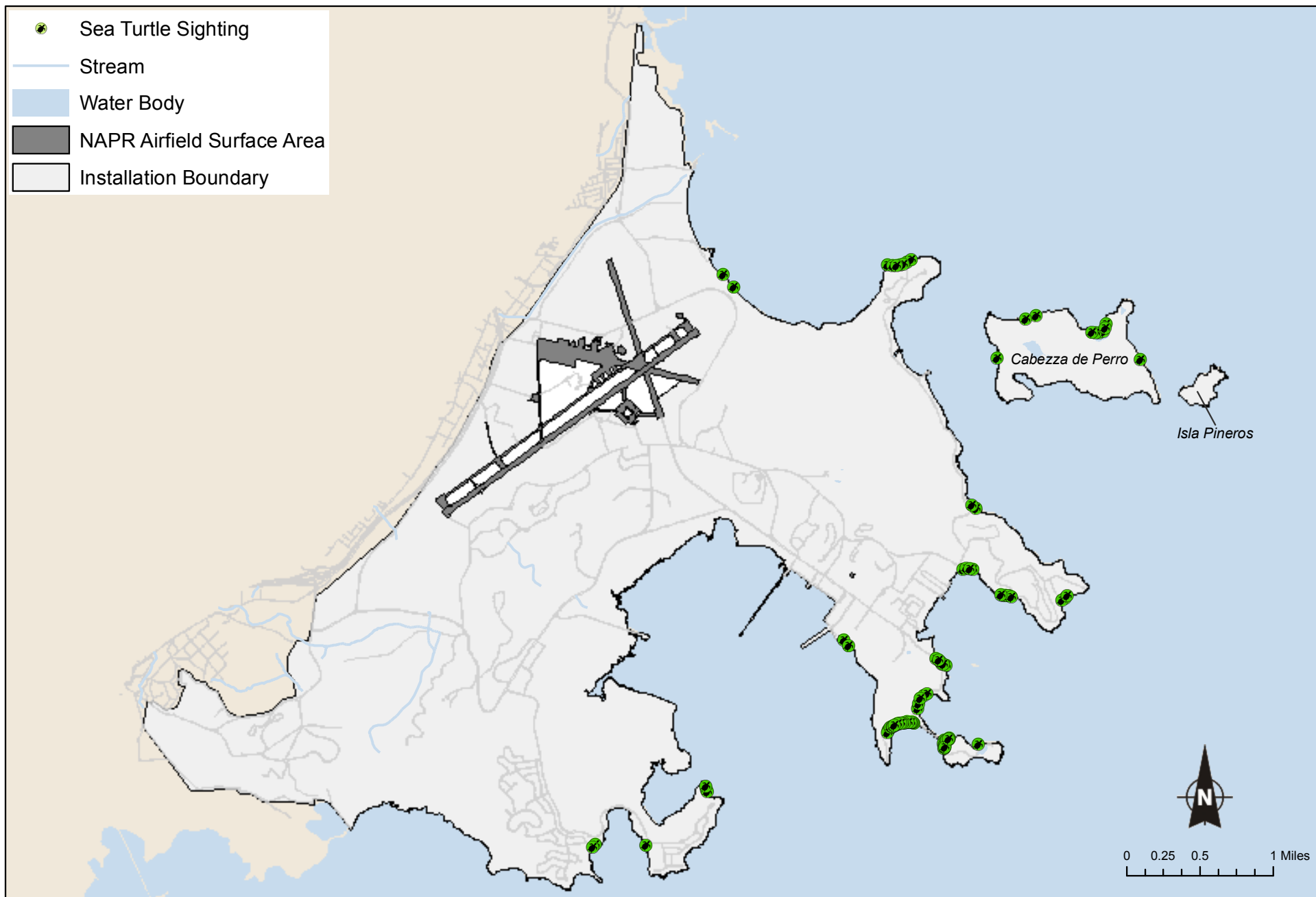
**Table 3-4 Number of Nests Recorded on NAPR Beaches in 2002 and 2004 During Weekly Beach Surveys**

Beach #	# of Nests in 2002	# of Nests in 2004
2	5	0
3	1	0
7	3	0
9	5	0
10	1	1
12	6	0
14	0	6
15	9	1
16	0	1
17	5	0
18	30	4
19	1	0
22	0	2
25	2	0
A	0	1
B	5	0
<b>Total</b>	<b>73</b>	<b>16</b>

Source: Geo-Marine, Inc. September 2005

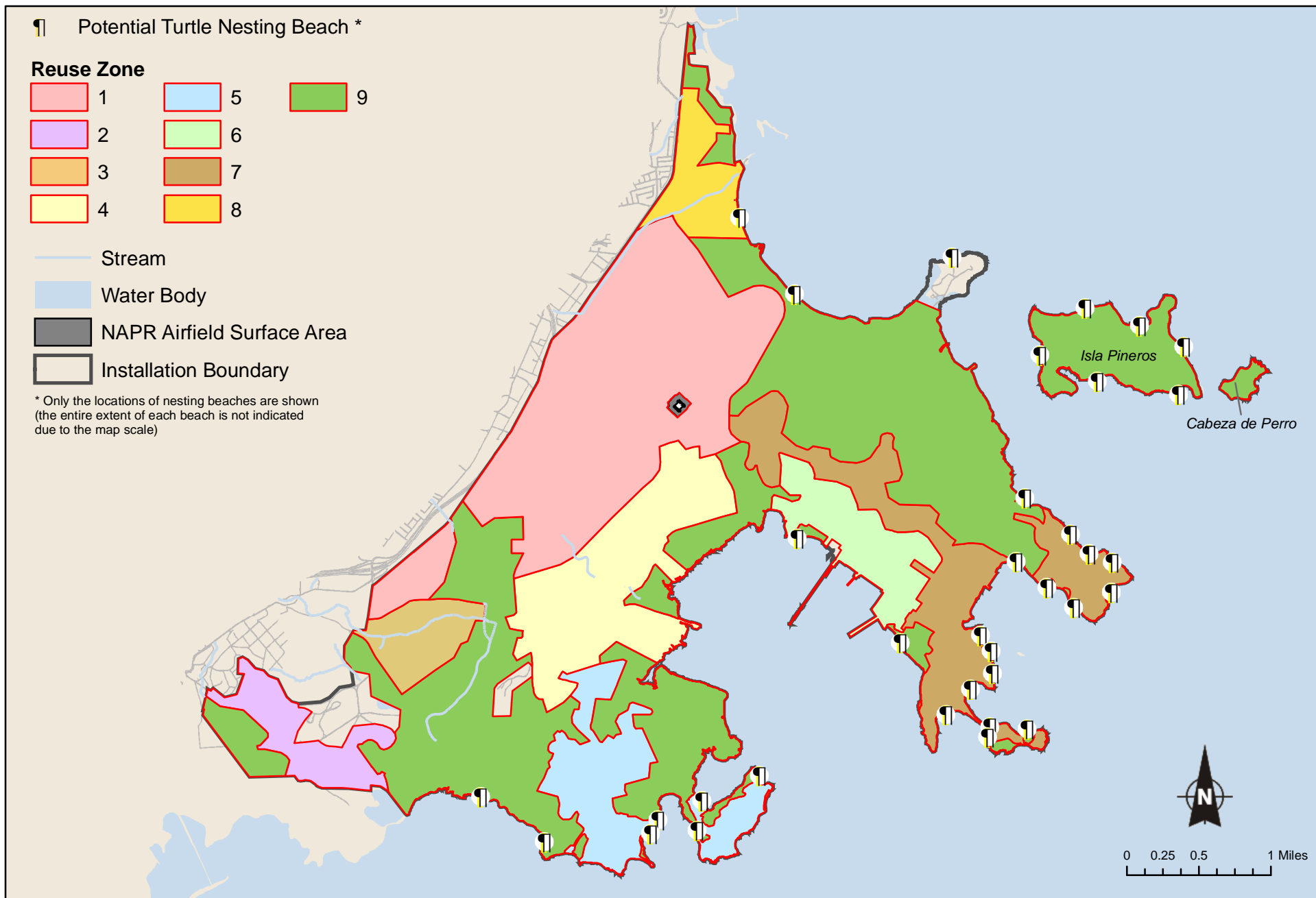
### 3.10.2.2 Puerto Rican Boa

The Puerto Rican boa (*Epicrates inornatus*) exists only in Puerto Rico. The forested limestone hill area seems to be the boa's preferred habitat, but the species can be found in subtropical moist forests, subtropical wet forests, subtropical dry forests and occasionally in disturbed urban and suburban habitats (Tolson 2004). The boas use ground level retreats for sleeping during the day and apparently hunt most of their prey in nearby trees at night. Observations of captive specimens suggest that under natural conditions the diet of sub-adults and adults consists of birds, small mammals, and lizards. The feeding habits of the very young are unknown. Critical habitat has not been designated for this species (U.S. Fish and Wildlife Service 1986).



Source: Geo-Marine, 2005; ESRI, 2004; USFWS, 2005;

**Figure 3-11**  
**Cumulative Sea Turtle Sightings from March 1984 through**  
**March 1995 Obtained from Weekly Aerial Surveys of the**  
**Former Naval Station Roosevelt Roads**  
**Naval Activity, Puerto Rico**



Source: Geo-Marine, 2005; ESRI, 2004;

**Figure 3-12**  
**Potential Turtle Nesting Sites**  
**Naval Activity Puerto Rico**

Four Puerto Rican boa sitings were reported at NAPR prior to 1999 and an additional four occurrences were reported between 2001 and 2003 (Geo-Marine, Inc. September 2005). Habitat assessments and nighttime surveys for Puerto Rican boa and Virgin Islands tree boa were conducted in 2004. All forested areas surveyed at the base presented a severely disturbed aspect with very young secondary growth (Tolson 2004). These recovering forested areas offer some habitat for the Puerto Rican boa. However, habitat is less than ideal in most places (Tolson 2004). The forest of Punta Cascajo, northwest of FDR Drive, offers the most suitable habitat at NAPR for the Puerto Rican boa, and the hills near South Delicias are expected to mature into excellent habitat for Puerto Rican boa. No Puerto Rican boas were found during 211 man-hours of surveys in potential boa habitat. A shed skin was found in an abandoned building at the NAPR Flying Center, where two sightings of the Puerto Rican boa have been reported (Tolson 2004). Puerto Rican boas apparently occur in low densities at NAPR (Tolson 2004).

### **3.10.2.3 Virgin Islands Tree Boa**

The Virgin Island tree boa (*Epicrates monensis granti*) is commonly associated with subtropical dry forest, coastal forests, and mangrove habitats with an abundance of multi-trunk tree species with interlocking canopies (Tolson 2004). They hunt at heights from eye level to as high as 5 meters in scrub and coastal forests (Tolson 2004). During the day, these boas may seek concealment on the ground under rocks, logs, and loose sections of termite nests (Tolson 2004). The bulk of the boa's diet seems to consist of the lizard *Anolis cristatellus*. However, this boa may opportunistically consume small mammals and nestlings of small birds (see <http://endangered.fws.gov/i/c/sac0q.html> and [http://ecos.fws.gov/species\\_profile/SpeciesProfile?spcodeC02E](http://ecos.fws.gov/species_profile/SpeciesProfile?spcodeC02E)). Critical habitat has not been designated for this species (Geo-Marine, Inc. September 2005).

No historical or recent sitings of the Virgin Island tree boa have occurred at NAPR (Geo-Marine, Inc. September 2005). Habitat assessments and nighttime surveys for Puerto Rican boa and Virgin Islands tree boa were conducted in 2004. All forested areas surveyed at the base presented a severely disturbed aspect with very young secondary growth (Tolson 2004). While Puerto Rican boa were reestablished in previously disturbed areas, the Virgin Island tree boa seems to be able infrequently to re-colonize areas from which it has been extirpated (Tolson 2004). The Punta Puerco and Puerto Medio Muno coastlines offer the best habitat at NAPR for the Virgin Island tree boa

(Tolson 2004). However, no Virgin Island tree boas were found during the field surveys of 2004. While populations of the Virgin Islands tree boa occur nearby in Rio Grande, Playa Naguabo, and Humacao, this species' existence at NAPR is not confirmed (Tolson 2004).

### **3.10.3 Birds**

Four federally and Commonwealth-listed threatened and endangered avian species are known to occur at or in coastal habitats adjacent to NAPR. An additional six species listed only by the Commonwealth are known to occur at the base.

Commonwealth-listed species at NAPR include peregrine falcon (*Falco peregrinus*), Least tern (*Sterna antillarum*), Least grebe (*Tachybaptus dominicus*), West Indian whistling duck (*Dendrocygna arborea*), Caribbean coot (*Fulica caribea*), and snowy plover (*Charadrius alexandrinus*). The peregrine falcon typically nests on cliffs, bridges, tall buildings, and other tall structures. Because these features are not at NAPR, peregrine falcons are not expected to nest at NAPR and use is expected to be limited to transient individuals. The West Indian whistling duck uses mangroves and other forested wetlands. The Least grebe and Caribbean coot are found in freshwater habitats on lakes, marshes, swamps, and ponds and on rivers, streams, and other habitats with emergent vegetation and occasionally in brackish water, where they feed on aquatic vegetation and small invertebrates. Snowy plover and Least Terns nest and feed on sandy beaches and mudflats.

#### **3.10.3.1 Yellow-shouldered Blackbird**

The USFWS (<http://endangered.fws.gov/i/b/sab5u.html>) notes that “the yellow-shouldered blackbird (*Agelaius xanthomus*) is endemic to Puerto Rico and nearby Mona Island. While once widespread throughout Puerto Rico, the species is now limited to three areas: the coastal southwestern area; a small coastal eastern area; and Mona Island. . . . Studies by Post and Wiley of southwestern Puerto Rico, the population center for the species, indicated that during the nesting season (May to September) most of the birds stay either in the mangrove zone or the arid coastal fringe. Nesting occurs in mangroves along the coast and on small off-shore islands. Other nesting habitat includes large deciduous trees, primarily oxhorn bucida (*Bucida buceras*) in dry lowland pastures; coconut trees (*Cocos nucifera*); royal palms (*Roystonea borinquena*); and on Mona, the



sheer coastal cliffs which surround the island. . . . One of the principal reasons for the decline is attributed to parasitism by the shiny cowbird (*Molothrus bonariensis*), which lays its eggs in the blackbird's nest and sometimes punctures the host's eggs." Other reasons for decline include introduced pest species (black rat, Norway rat, and mongoose), disease (fowl pox), and habitat loss. Habitat modification and destruction from hurricanes and other natural events have eliminated both foraging and nesting areas. "Today, an important factor is the threatened loss of habitat, especially the coastal and offshore island mangroves where about 86 percent of the nesting now occurs."

In 1976 the entire land area at NAPR was designated as critical habitat for the yellow-shouldered blackbird. The yellow-shouldered blackbird population at NAPR, the second largest population in Puerto Rico in 1976, declined by 97% from 1976 to 1982. The species was believed to be absent from NAPR following Hurricane Hugo in 1989. However, several incidental sightings from 1993 to 1999 and four yellow-shouldered blackbird nests found in the summer of 1999 prompted the Navy to conduct detailed surveys for the species in 2000, 2002, and 2004. Survey data revealed an increase in yellow-shouldered blackbird observations from 1995 through 2000 and a decline from 2000 through 2004. The number of documented nesting pairs fell from five in 2000 to one unconfirmed nest in 2004. No observations of yellow-shouldered blackbird were recorded during post breeding surveys at NAPR, but incidental observations have been recorded (Geo-Marine, Inc. September 2005).

### **3.10.3.2 Brown Pelican**

The USFWS (<http://endangered.fws.gov/i/b/sab2s.html>) notes that "the brown pelican (*Pelecanus occidentalis*) is found along the coast in California and from North Carolina to Texas, Mexico, the West Indies and many Caribbean Islands, and to Guyana and Venezuela in South America. Feeding occurs primarily in shallow estuarine waters with the birds seldom venturing more than 20 miles out to sea except to take advantage of especially good fishing conditions, and even then it is rare to find one more than 40 miles out. Sand spits and offshore sand bars are used extensively as daily loafing and nocturnal roost areas. The preferred nesting sites are small coastal islands which provide protection from mammal predators, especially raccoons, and sufficient elevation to prevent wide-scale flooding of nests. . . . Of the factors impinging upon the U.S. Caribbean subspecies, food is the most influential. The timing and success of the breeding cycle and the pro-

nounced seasonal fluctuations of pelican numbers in the region appears to be closely tied to alternating, yet unpredictable, periods of food abundance and scarcity. Although the nucleus of the breeding population is located in the U.S. Virgin Islands, pelicans of both age classes migrate to Puerto Rico post-season, presumably to exploit more predictable food resources associated with extensive estuarine and mangrove systems. Young pelicans will often remain in Puerto Rico for 5 years until they reach maturation. Adults remain there until they meet pre-breeding nutritional requirements and return to breeding colonies in Puerto Rico and the U.S. Virgin Islands. . . . Among the most serious man-induced threats to the Caribbean subspecies are poaching of eggs, young, and adults; human disturbance; entanglement in fishing gear; and loss or degradation of mangrove forests.”

No critical habitat is designated for the species at NAPR, on adjacent cays, or in nearby coastal waters (Geo-Marine, Inc. September 2005). The brown pelican appears to be a common seasonal resident at NAPR and in the surrounding coastal waters (Geo-Marine, Inc. September 2005). Small numbers, primarily juveniles, were seen day-roosting, feeding, and resting irregularly in onshore and near-shore habitats at NAPR. However, no brown pelican nesting colonies were found at NAPR or on the small cays nearby (Geo-Marine, Inc. September 2005).

### **3.10.3.3 Piping Plover**

The USFWS (<http://pipingplover.fws.gov/overview.html>) notes that “the piping plover (*Charadrius melodus*) breeds on coastal beaches from Newfoundland to North Carolina and winters primarily on the Atlantic Coast from North Carolina to Florida, although some migrate to the Bahamas and West Indies.” No critical habitat for piping plover has been designated in Puerto Rico (Geo-Marine, Inc. September 2005).

The piping plover was observed during migration but was not known to nest at NAPR, as noted in the 1987 Land Management Plan for Naval Station Roosevelt Roads (Ecology and Environment, Inc. 1987), but no specific siting information was recorded. No piping plover observations were reported at NSRR during the 1990s or during sea turtle nesting surveys conducted in 2002 and 2004 (Geo-Marine, Inc. September 2005). The occurrence status at NAPR is expected to be limited to vagrants; a vagrant species occurs less frequently than once every 10 years (Geo-Marine, Inc. September 2005).

#### **3.10.3.4 Roseate Tern**

“In the Caribbean, the roseate tern [*Sterna dougallii dougallii*] breeds from Florida through the West Indies to islands off Central America and northern South America. . . . Roseate terns breed primarily on small offshore islands, rocks, cays, and islets. Rarely do they breed on large islands. They have been reported nesting near vegetation or jagged rock, on open sandy beaches, close to the waterline on narrow ledges of emerging rocks, or among coral rubble” (<http://endangered.fws.gov/i/b/sab6h.html>). Critical habitat has not been designated for this species (Geo-Marine, Inc. September 2005).

No historic evidence is available to indicate whether the roseate tern has ever nested at NAPR and no roseate tern observations have been noted in or over coastal waters adjacent to NAPR. No roseate terns were spotted during the 2002 and 2004 boat and pedestrian surveys of sea turtle nesting beaches at NAPR. The nearest active roseate tern colony likely occurs on the eastern end of Vieques (more than 20 miles [32 km] east of NAPR) (Geo-Marine, Inc. September 2005). Although the occurrence of the roseate tern at NAPR has never been documented, the species should be considered accidental at NAPR because the species could be pushed into nearby coastal waters or inshore during a hurricane.

#### **3.10.4 Plants**

##### **Cobana Negra**

Cobana negra (*Stahlia monosperma*), a medium-sized evergreen tree that reaches 25 to 50 feet (8 to 16 m) in height and 1 to 1.5 feet in diameter, is found on the edge of salt flats in brackish, seasonally flooded wetlands. Its associates are black mangrove and buttonwood mangrove. A Cobana negra tree was identified in a mangrove stand near the Coast Guard (old ammunition) pier in Enseñada Honda in 1989 (Vicente *et al.* 1989). In August 2004, Geo-Marine, Inc. conducted rare species surveys at NAPR and identified a single individual of this species in a coastal scrub forest area west of American Circle (Geo-Marine, Inc. September 2005).

## 3.11 Socioeconomics

### 3.11.1 Population and Housing

#### Population

NAPR is located within the municipal boundaries of Ceiba and Naguabo. The local region for the area surrounding NAPR is the Fajardo/Ceiba Region, which represents eight municipalities: Ceiba, Fajardo, Humacao, Las Piedras, Loiza, Luquillo, Naguabo, and Rio Grande.

The eight municipalities of the Fajardo/Ceiba Region represent 7% of the total population of Puerto Rico, while the five municipalities that comprise the San Juan Region account for 28% of the total population (Reuse Plan). The 1990 and 2000 population of Puerto Rico, the San Juan Region, and the Fajardo/Ceiba Region is presented in Table 3-5.

**Table 3-5 Population for Puerto Rico, San Juan, and Fajardo/Ceiba Regions**

	1990	2000	% Change
<b>Puerto Rico</b>	<b>3,522,037</b>	<b>3,808,610</b>	<b>0.8%</b>
<b>San Juan Region</b>	<b>1,024,406</b>	<b>1,050,346</b>	<b>0.3%</b>
<b>Fajardo/Ceiba Region</b>	<b>252,801</b>	<b>280,075</b>	<b>1.0%</b>
Ceiba	17,145	18,004	0.5%
Fajardo	36,882	40,712	1.0%
Humacao	55,203	59,035	0.7%
Las Piedras	27,896	34,485	2.1%
Loiza	29,307	32,537	1.1%
Luquillo	18,100	19,187	0.6%
Naguabo	22,620	23,753	0.5%
Rio Grande	45,648	52,362	1.4%

Source: CB Richard Ellis *et al.* September 21, 2004 (i.e., Reuse Plan).

The average growth of the Fajardo/Ceiba Region (1.0%) slightly outpaced the Commonwealth of Puerto Rico (0.8%), and the San Juan Region (0.3%). It is anticipated that this higher local growth rate will continue through 2025 (see Table 3-7 below), with a projected increase in population from 2000 to 2025 of 0.5%, compared with 0.4% for the Commonwealth and 0.2% for the San Juan Region (Reuse Plan).

## Housing

The existing housing stock at NAPR includes 801 single and multi-family residential facilities comprising 2,417,010 square feet. The majority of single-family houses (676 of 801) are small, with low-sloping built-up roofs and ranging in size from 1,600 to 2,000 square feet. Of the 676 single-family dwellings, 319 have been recently renovated. Another 98 buildings consist of small multi-family dwellings designed to accommodate two to eight families, and the remaining 27 buildings are large-scale multi-family (see Table 3-6). All of these units are vacant due to the closure of NSRR.

**Table 3-6 Existing Housing Statistics at NAPR**

Housing Type	Number of Units	SF (in thousands)	% of Total
Single Family	676	1,233	51%
Small Multi-Family	98	474	20%
Large Multi-Family	27	710	29%
<b>Total</b>	<b>801</b>	<b>2,417</b>	<b>100%</b>

Source: CB Richard Ellis *et al.* September 2004 (i.e., Reuse Plan).

The housing resources in the Fajardo/Ceiba Region include 107,915 units as of 2000, which represents approximately a 2.4% average annual growth over the 1990 stock of 85,142 housing units. From 1990 to 2000 the number of housing units grew faster than the region's population, creating an excess of housing units. The Region's vacancy rate of 16% was higher than the island average of 11%. Table 3-7 depicts population and housing projections for Puerto Rico and select municipality regions.

**Table 3-7 Population and Housing Projections (2000-2025)**

Region	2000 - 2005 <sup>1</sup>	2005 - 2010	2010 - 2015	2015 - 2020	2020 - 2025	Total 2000 - 2025
<b>Puerto Rico</b>						
New Residents	123,865	92,283	80,376	61,714	42,145	400,383
Average Annual Growth	0.6%	0.5%	0.4%	0.3%	0.2%	0.4%
New Housing Units <sup>2</sup>	41,565	30,967	26,972	20,709	14,143	134,357
<b>Fajardo/Ceiba Region<sup>3</sup></b>						
New Residents	11,534	9,208	7,427	5,922	4,017	38,108
Average Annual Growth	0.8%	0.6%	0.5%	0.4%	0.3%	0.5%
New Housing Units <sup>2</sup>	3,870	3,090	2,492	1,987	1,348	12,788

**Table 3-7 Population and Housing Projections (2000-2025)**

Region	2000 - 2005 <sup>1</sup>	2005 - 2010	2010 - 2015	2015 - 2020	2020 - 2025	Total 2000 - 2025
<b>San Juan Region<sup>4</sup></b>						
New Residents	18,189	7,540	11,368	6,758	6,004	49,859
Average Annual Growth	0.3%	0.1%	0.2%	0.1%	0.1%	0.2%
New Housing Units <sup>2</sup>	6,104	2,530	3,815	2,268	2,015	16,731

Source: CB Richard Ellis *et al.* September 2004 (i.e., Reuse Plan).

Notes:

<sup>1</sup> These figures are based on the estimated population as of July 1, 2000, as provided by the Puerto Rico Planning Board.

<sup>2</sup> Based on the island-wide average of 2.98 persons per household.

<sup>3</sup> Includes the following municipalities: Ceiba, Fajardo, Humacao, Las Piedras, Loiza, Luquillo, Naguabo, and Rio Grande.

<sup>4</sup> Includes the following municipalities: San Juan, Bayamon, Carolina, Guaynabo, Catano, and Trujillo Alto.

### 3.11.2 Economy, Employment, and Income

#### Economy

The primary economic sectors of the local economy of the Fajardo/Ceiba Region include tourism, marinas and ports, and industrial and retail uses.

- **Tourism.** Although tourism in Puerto Rico represents a small segment of the economy when measured in terms of direct expenditures by non-resident tourists, its overall importance and impact is much greater in terms of employment and income multipliers. There were approximately 4.4 million visitors to Puerto Rico during fiscal year 2002. These visitors spent nearly \$2.4 billion during their time on the island. Total direct, indirect, and induced employment in the tourism industry during fiscal year 2002 was just over 56,000 persons (Reuse Plan).

The northeast region of Puerto Rico is one of the premier destinations on the island because it is close to El Yunque National Park and the sister islands of Vieques and Culebra (known as the Spanish Virgin Islands) and because of the large number of golf courses and marinas. Several well-known hotels are located in the Fajardo/Ceiba Region, including the Westin Rio Mar Beach Resort and Ocean Villas in Rio Grande and the Wyndham El Conquistador Resort and Las Casitas Village in Fajardo (Reuse Plan).

- **Marinas and Ports.** The eastern region of Puerto Rico is often referred to as the Gold Coast for its numerous beaches, resorts, and many ports and marinas for boating activities. Table 3-8 lists several marinas in eastern Puerto Rico and their associated boat capacity. There are additional planned expansions at several marinas in eastern Puerto Rico that would increase their capacity by almost 1,000 slips, or 26% (Reuse Plan).

NAPR has an existing marina that includes 72 boat slips and 25 moorings. Use of the marina has historically been limited to Navy personnel. Each boat slip is approximately 12 feet wide and most are approximately 31 feet long,

with a few in the range of 17 to 35 feet. The facility is generally in good condition as it is relatively new (Reuse Plan).

**Table 3-8 Marinas in the Eastern Region of Puerto Rico**

Marina Name	Wet Slips	Dry Stacks	Total Spaces
Puerto Chico	278	276	554
Sea Lovers	110	0	110
Villa Marina	266	576	842
Puerto del Rey	1,000	524	1,524
El Conquistador	22	0	22
Isleta Marina	240	0	240
Palmas del Mar	230	0	230
Roosevelt Roads	72	0	72
<b>Total</b>	<b>2,218</b>	<b>1,376</b>	<b>3,594</b>

Source: CB Richard Ellis *et al.* September 2004 (i.e., Reuse Plan).

- **Industry.** The industrial market in Puerto Rico is characterized primarily by owner-occupied manufacturing facilities (including, in particular, pharmaceuticals) and for-lease properties owned by the Puerto Rico Industrial Development Company (PRIDCO). PRIDCO estimates that it owns approximately 88% of the total industrial space available for lease in Puerto Rico. As of April 1, 2004, PRIDCO owned approximately 24.8 million square feet of industrial buildings. Of this total, approximately 75% was leased, with much of the vacant inventory being either reserved for prospective tenants or under negotiation for lease (Reuse Plan). With the moderately high current and projected occupancy rates, PRIDCO has plans for new construction to increase their inventory and their presence in the industrial sector.
- **Retail.** Driven by consistently strong sales, Puerto Rico's retail market experienced a development boom in the 1990s, with about 11 million square feet of new retail space constructed between 1996 and 1999. The market is dominated by shopping centers with big box retailers as anchor tenants, and demand for retail space in Puerto Rico continues to be strong. Although development has stalled since the expansion period of the 1990s, the island-wide vacancy rate is approximately 5% and rental rates have been stable (Reuse Plan).

As shown in Table 3-9, retail sales in Puerto Rico increased 46% between 1992 and 1997, the most recent years for which data were available. Humacao and Fajardo have both the highest number of establishments and sales within the Fajardo/Ceiba Region.

**Table 3-9 Comparison of Total Retail Sales, Puerto Rico, 1992 and 1997**

Retail Category	1992 (millions)	1997 (millions)	Change
Building Materials	\$616	\$973	58.0%
General Merchandise	\$1,503	\$2,230	48.4%
Food	\$2,960	\$3,621	22.3%
Automotive Dealers	\$1,688	\$3,396	101.2%
Gasoline Service Stations	\$711	\$1,141	60.5%
Apparel and Accessories	\$1,205	\$1,414	17.3%
Home Furniture	\$772	\$1,119	44.9%
Eating and Drinking	\$934	\$1,445	54.7%
Drug and Proprietary	\$657	\$897	36.5%
Misc. Retail	\$661	\$853	29.0%
<b>Total</b>	<b>\$11,707</b>	<b>\$17,088</b>	<b>46.0%</b>

Source: CB Richard Ellis *et al.* September 2004 (i.e., Reuse Plan).

## Employment and Income

Employment statistics by industry and occupation for the Commonwealth of Puerto Rico, the Fajardo/Ceiba Region, and the municipalities that comprise the Region are presented in Table 3-10. The distribution of employment remains fairly even between the different geographic areas. The five major employment industries in the Fajardo/Ceiba Region are education, health and social services (18.3%), manufacturing (15.3%), retail trade (11.2%), public administration (12.1%), and construction (10.7%) (Reuse Plan).

**Table 3-10 Employment by Industry**

Industry	Puerto Rico		Fajardo/Ceiba	
Employed Population 16+	930,865	100%	64,158	100%
<b>Employment by Industry</b>				
Education, health, and social services	179,374	19.3%	11,731	18.3%
Manufacturing	125,450	13.5%	9,818	15.3%
Retail Trade	109,339	11.7%	7,207	11.2%
Public Administration	99,268	10.7%	7,742	12.1%
Construction	80,288	8.6%	6,878	10.7%
Prof., scientific, admin, waste mgmt	62,994	6.8%	3,525	5.5%
Arts, accommodation, and food services	60,873	6.5%	5,631	8.8%
Other services (except public admin)	50,123	5.4%	3,240	5.1%
Finance, Insurance, Real Estate	46,353	5.0%	2,308	3.6%
Wholesale Trade	40,518	4.4%	1,882	2.9%
Trans. and Warehousing, and utilities	39,509	4.2%	2,505	3.9%
Information	20,877	2.2%	1,074	1.7%
Ag, forestry, fishing/hunting, and mining	15,899	1.7%	617	1.0%



**Table 3-10 Employment by Industry**

Industry	Puerto Rico		Fajardo/Ceiba	
Employment by Occupation				
Sales and office	260,317	28.0%	16,637	25.9%
Management, professional, and related	255,417	27.4%	14,583	22.7%
Service	150,657	16.2%	12,180	19.0%
Production, trans. and material moving	141,327	15.2%	10,989	17.1%
Construction, extraction, and maintenance	112,776	12.1%	9,392	14.6%
Farming, fishing and forestry	10,371	1.1%	377	0.6%

Numerous large companies in Puerto Rico contribute to the industrial sector and general employment within the Commonwealth. These companies are primarily in three major categories: (1) pharmaceuticals and biotechnology; (2) medical instruments; and (3) electronics. Based upon estimates from the Department of Economic Development and Commerce for the Commonwealth of Puerto Rico, since 2002 recent investments from eighteen selected major companies totaled \$2.1 billion and committed more than 5,000 jobs (Reuse Plan).

The Commonwealth of Puerto Rico had a relatively high unemployment rate (7.8%) in 2000 and a low median household income (\$14,412) when compared with the mainland United States. Similarly, the median household income and unemployment rates for the municipalities in the Fajardo/Ceiba Region is in most instances comparable to the Commonwealth statistics (see Table 3-11). However, the municipalities of Loiza, Luquillo, and Naguabo are considerably lower than the median household income for the entire island.

**Table 3-11 Median Household Income, Unemployment, and Poverty Figures by Municipality (2000)**

	Median Household Income	Unemployment Rate	Population with Income Below Poverty	Percent Below Poverty
<b>Puerto Rico</b>	<b>\$14,412</b>	<b>7.8%</b>	<b>1,818,687</b>	<b>48.2%</b>
<b>Fajardo/Ceiba Region</b>	—	—	—	—
Ceiba	\$16,440	7.0%	6,479	38.6%
Fajardo	\$15,410	7.7%	17,045	42.1%
Humacao	\$14,345	7.3%	27,690	47.2%
Las Piedras	\$14,622	9.1%	16,226	47.3%
Loiza	\$11,200	9.8%	19,394	59.7%
Luquillo	\$13,631	9.5%	10,203	51.7%
Naguabo	\$11,461	7.9%	13,051	56.0%
Rio Grande	\$15,006	8.0%	24,130	46.6%

Source: CB Richard Ellis *et al.* September 2004 (i.e., Reuse Plan); U.S. Census Bureau 2004.

In addition, the percentage of individuals living below poverty in Puerto Rico is nearly 50%. In the Fajardo/Ceiba Region, the percent living below poverty ranges between 39% and 60%, with the highest number of identified individuals residing in Loiza, Luquillo, and Naguabo (Reuse Plan; U.S. Census Bureau 2004).

## Taxes and Revenue

The property of the former NAPR has not been subject to property taxes during its ownership by the United States government. Table 3-12 and Table 3-13 present the basic revenue and expenditure streams for the municipalities of Ceiba and Naguabo, respectively. (The percent of total column shows the basic sources of revenue for the municipalities and where the funds received are spent.) Some categories were combined or organized by general category to afford a certain level of comparison between the municipalities. The major source of revenue in each municipality is from intergovernmental revenue, either from the Commonwealth or through benefits from the United States government. Expenditures are more evenly distributed across government agencies and expenses.

**Table 3-12 Municipal Revenues for Ceiba and Naguabo (2002-2003)<sup>1</sup>**

Revenue Description	Ceiba		Naguabo	
	2002-2003	%	2002-2003	%
Municipal Patents	565,000	9%	0	-
License Interest and Surcharges	1,130	<1%	0	-
Other Local Taxes	200	<1%	0	-
Property Taxes	328,022	5%	1,537,154	15%
Construction/Business Taxes	700,000	11%	667,204	6%
Licenses and Permits	2,500	<1%	387,432	4%
Compensation	541,122	8%	0	-
Intergovernmental Income	3,160,491	48%	5,317,712	50%
Federal Assistance	0	-	2,470,568	23%
State Compensations	85,000	1%	0	-
Transportation Services	5,000	<1%	0	-
Fines	5,000	<1%	0	-
Investment Interests	50,000	1%	0	-

**Table 3-12 Municipal Revenues for Ceiba and Naguabo (2002-2003)<sup>1</sup>**

Revenue Description	Ceiba		Naguabo	
	2002-2003	%	2002-2003	%
Incidental Income	200,000	3%	0	-
Rents	15,000	<1%	86,996	1%
Other Miscellaneous	860,642	13%	84,798	1%
<b>Totals</b>	<b>6,519,108</b>	<b>100%</b>	<b>10,551,864</b>	<b>100%</b>

Source: Municipality of Ceiba, Municipality of Naguabo.

Note:

<sup>1</sup> For the purpose of this table, some revenue categories were combined and may not appear to precisely correspond with the municipal records.

**Table 3-13 Municipal Expenditures for Ceiba and Naguabo (2002-2003)<sup>1</sup>**

Expenditure Description	Ceiba		Naguabo	
	2002-2003	%	2002-2003	%
Mayor and Municipal Legislature	487,631	7%	733,273	6%
General Government	2,298,199	35%	4,939,665	39%
Public Safety	573,209	9%	411,172	3%
Public Works	1,542,304	24%	845,910	7%
Culture and Recreation	509,167	8%	184,623	1%
Health and Sanitation	329,023	5%	113,852	1%
Solid Waste Disposal	—	—	866,753	7%
Human Services and Welfare	338,931	5%	1,763,421	14%
Urban Development	—	—	2,113,686	17%
Office of Emergency Management	230,306	4%	—	—
Department of Public Relations	210,338	3%	—	—
Debt Service: Principal	—	—	350,000	3%
Debt Service: Interest and Other Charges	—	—	158,477	1%
Capital Outlay	—	—	54,779	<1%
<b>Total</b>	<b>6,519,108</b>	<b>100%</b>	<b>12,535,611</b>	<b>100%</b>

Source: Municipality of Ceiba, Municipality of Naguabo.

Note:

<sup>1</sup> For the purpose of this table, some expenditure categories were combined and may not appear to precisely correspond with the municipal records.

### 3.11.3 Community Services and Facilities

#### Police

The area surrounding NAPR is within the jurisdiction of a combination of either the Commonwealth Police Department or one of the two nearby municipal police departments (Ceiba or Naguabo). It is estimated that these police departments account for approximately 170 total officers locally. This equates to approximately 4.1 police officers per 1,000 local residents.

## Fire

NAPR was formerly responsible for its own fire protection. There is one fire department each located in Ceiba and Naguabo, with approximately 20 total full-time firefighters stationed locally. This equates to approximately 0.5 firefighters per 1,000 local residents.

## Hospitals/Medical Facilities

The one existing hospital located at NAPR is a three-story, 130,000 square foot facility with a 36-bed capacity. The Puerto Rico Health Department reports that the Eastern Region of the island is lacking in certain types of hospital and medical facilities. In particular, Ceiba has no medical facilities such as emergency rooms, hospitals, rest homes, home care providers, diagnostic and treatment centers, rehabilitation centers, ambulatory surgery centers, laboratories or blood banks. There is also no hospital in Naguabo and only one diagnostic/treatment center (Reuse Plan). The nearest hospital is located in Fajardo.

## Schools

NAPR has two schools—one elementary and one middle/high school. The specific size and capacity of the schools is noted below in Table 3-14.

**Table 3-14 Size and Capacity of NAPR Schools**

	Elementary School	Middle/High School
Classrooms	58	46
Permanent	41	38
Temporary	17	8
Size (in square feet)	85,280	52,255
Capacity (no. of students)	900	600

Source: CB Richard Ellis *et al.* September 2004 (i.e., Reuse Plan).

The Ceiba school district has 1,179 elementary students in three schools, 573 junior high students in one school, 484 high school students in a single school, and 62 special education students for a total of 2,298 students. It reports that there is insufficient space at the junior high level and that the high school does not currently offer vocational courses (Reuse Plan).

The Naguabo school district has 2,464 elementary students in 10 schools, 1,044 junior high students in four schools, and 717 high school students on one campus. Like Ceiba, Naguabo reports that it needs more facilities at the junior high level and that its high school does not offer vocational courses but wishes to do so (Reuse Plan).

## 3.12 Cultural Resources

### 3.12.1 Historic Buildings

Table 3-15 identifies 36 buildings/structures located at NAPR that are eligible for listing in the National Register of Historic Places (NRHP), either individually or as contributing elements to the Ammunitions Storage District or the Administration and Barracks District. These resources were evaluated as part of a comprehensive architectural survey conducted in 2000 and 2001, the findings of which are documented in the *Architectural Resources Inventory and Evaluation, Naval Station Roosevelt Roads Ceiba, Vieques and Culebra, Puerto Rico.* The Puerto Rico State Historic Preservation Office (SHPO) concurred with the findings of this report in correspondence dated March 3, 2003. Housing resources were evaluated in *Family Housing at the U.S. Naval Station Roosevelt Roads, Ceiba, Puerto Rico* (March 6, 1998). That report concluded that none of the family housing is NRHP-eligible and the SHPO concurred with these findings in a letter dated April 13, 1998.

**Table 3-15 Individually Eligible Buildings/Structures Located Outside Historic Districts**

Building	Year	Original Use
Structure 844, Bolles Dry Dock, 1943		
Building 38, Bombproof Generator Plant, 1944		
Building 256, Communication Center		
Building 504, Bombproof Telephone Building		
<b>Contributing Buildings Administrative and Barracks District</b>		
78	1943	Marine Barracks
201	1943	Marine Galley and Mess Hall
202*	1943	Marine Barracks
203	1943	Marine Barracks
<b>Contributing Buildings within the Ammunitions Storage District</b>		
300	1943	Inert Magazine
301	1943	Small Arms Storage
302	1943	Small Arms Storage
303	1943	Small Arms Storage
305	1943	Fuse and Detonator Magazine
306	1943	Fuse and Detonator Magazine

**Table 3-15 Individually Eligible Buildings/Structures Located Outside Historic Districts**

Building	Year	Original Use
307	1943	Fuse and Detonator Magazine
308	1943	Fuse and Detonator Magazine
309	1943	Fuse and Detonator Magazine
310	1943	Fuse and Detonator Magazine
311	1943	High Explosive Magazine
312	1943	High Explosive Magazine
313	1943	High Explosive Magazine
314	1943	High Explosive Magazine
358	1943	Small Arms Magazine
<b>Contributing Buildings within the Ammunitions Storage District</b>		
359	1943	Small Arms Magazine
360	1943	Small Arms Magazine
384	1958	High Explosive Magazine
764	1962	Magazine
765	1962	Magazine
766	1962	Magazine
1665	1967	Ready Issue Magazine
1666	1967	Ready Issue Magazine
1667	1967	Ready Issue Magazine
1668	1967	Arms Storage Magazine
1681	1969	Arms Storage Magazine
1682	1969	Arms Storage Magazine
1682A	1990	Arms Storage Magazine

\* Resource is considered individually eligible.

### 3.12.2 Archaeological Resources

The Navy conducted station-wide archaeological surveys in three phases from 1994 through 1996. More than 25% of the Naval Station was surveyed as part of this initiative, resulting in the identification of 27 archaeological sites. An additional four sites were identified during a survey conducted in the summer of 2004. Of the 31 sites identified to date that lie within the area to be disposed, 19 sites have been determined to be eligible and three sites are classified as potentially eligible for listing in the NRHP. The remaining sites have been determined to be not eligible for listing. The remaining 79 acres at the installation, which were identified as being relatively undisturbed and having a moderate to high potential for the presence of archaeological resources, were surveyed in mid-2005. The survey effort identified three additional sites as eligible for the National Register of Historic Places.

In a letter dated August 31, 2004, the Puerto Rico SHPO concurred that the Navy had completed identification and evaluation efforts for aboveground architecture, and with the work completed in the summer of 2004 the Navy has met the requirements for identifying archaeological resources as required under 36 CFR 800.4(a) through (c).

### **3.13 Coastal Zone Management**

Pursuant to the Coastal Zone Management Act (CZMA) of 1972, the Commonwealth of Puerto Rico has a federally approved Coastal Management Plan (CMP). The CMP defines the coastal zone, identifies the existing sensitive ecosystems within the coastal zone, highlights potential threats resulting from development, and outlines programs and policies designed to manage and protect this sensitive area. The coastal zone in Puerto Rico extends from the seaward boundary of the territorial sea (approximately 9 nautical miles) to 3,283 feet (1,000 m) inland from the ocean shoreline and further inland, as necessary, to include important natural coastal systems located landward of the zone's 3,283-foot (1,000-m) boundary. The coastal zone includes islands, intertidal areas, salt marshes, saltwater wetlands, beaches, and freshwater wetlands.

The purpose of the Puerto Rico CMP is to guide development of public and private property and water activities in the designated coastal zone. Commonwealth agencies principally responsible for enforcing compliance with planning and permitting in the coastal zone are the PRPB and the Puerto Rico DNER. The PRPB has the authority to issue development permits throughout Puerto Rico, including the maritime zone; it also issues federal consistency certifications for activities affecting coastal uses and resources. The Puerto Rico DNER is responsible for granting mining concessions and franchises for the use of surface and ground waters; the management of the maritime zone, coastal waters, and submerged lands; and the management of forests and the regulation of sand extraction, hunting, and fishing. The Division of Coastal Zone within the Puerto Rico DNER is responsible for administration and coordination of the CMP. In coordination with the U.S. Army Corps of Engineers (USACE), the PRPB and Puerto Rico DNER have developed a joint application process to assist individuals applying for permits for activities that will affect the coastal resources, including the issuance of a certificate of coastal consistency with the Puerto Rico CMP.

Lands owned by the federal government are excluded from the defined coastal zone. However, as required by Section 307(c) of the CZMA, any federal activity that di-

rectly or indirectly affects any land or water use or natural resource of the coastal zone must be consistent with the CMP to the maximum extent possible.